Refrigeration Service Engineer

TECHNOLOGY DEPT.

VOL. 10 NO. 11 ★ ★ ★ NOVEMBER 1942

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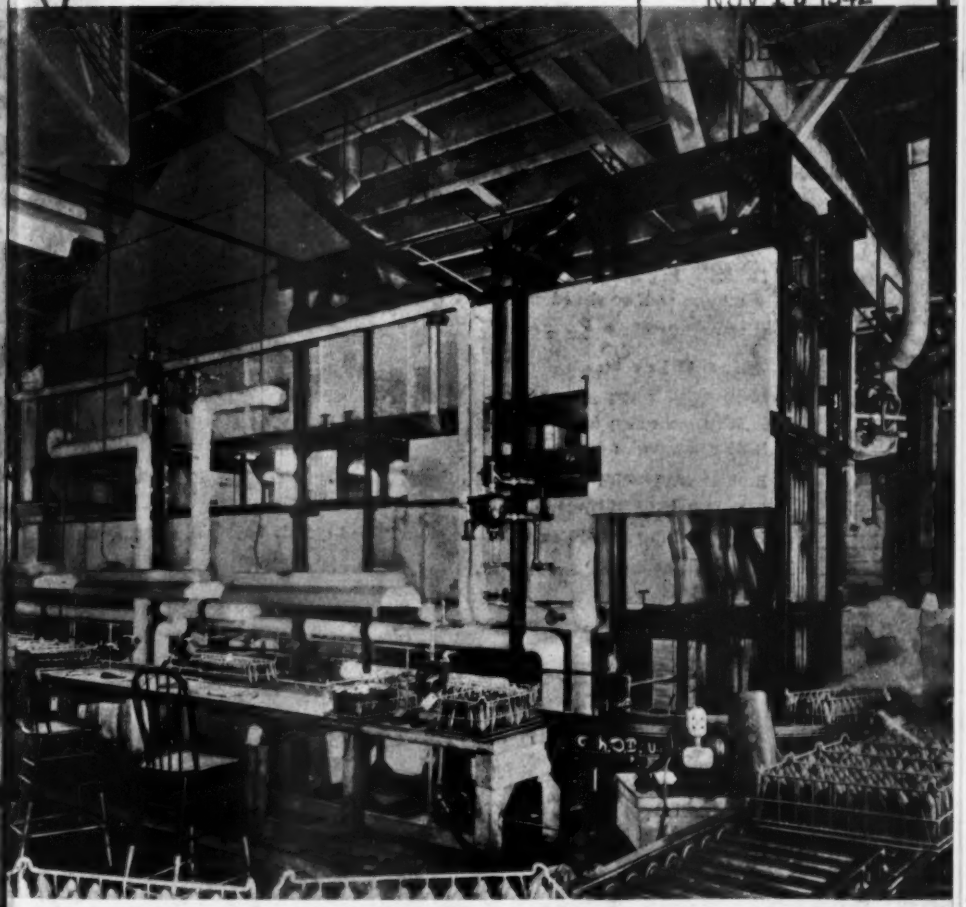

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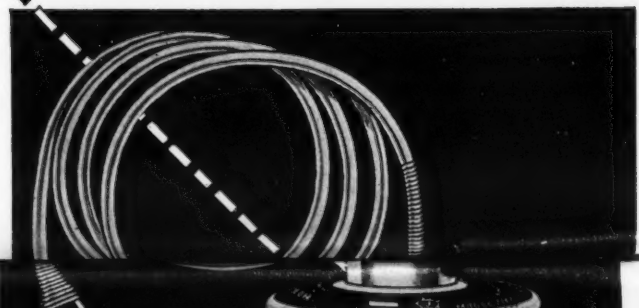

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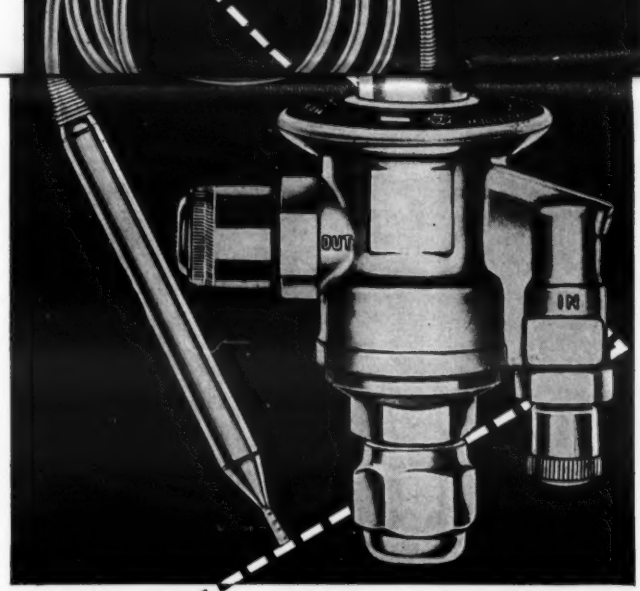

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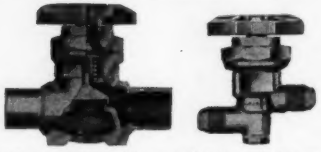

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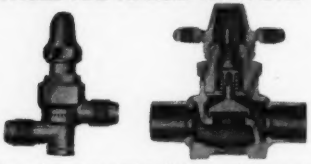

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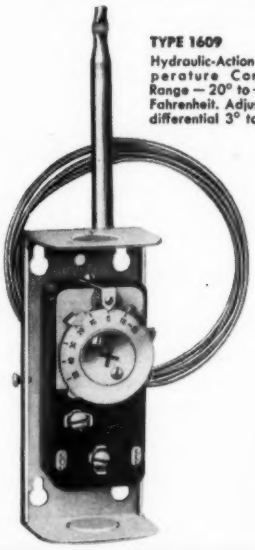

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MR. E. A. PLESSKOTT
President of the Refrigeration Service Engineers Society.

Now in its tenth year, the Refrigeration Service Engineers Society today numbers approximately 2,000 members in 65 local chapters in the United States and Canada.

During these past ten years, Wolverine has wholeheartedly cooperated with this progressive organization. And to the Society, and to the refrigeration industry as a whole, we pledge present and future cooperation to the very utmost of our ability and long experience.

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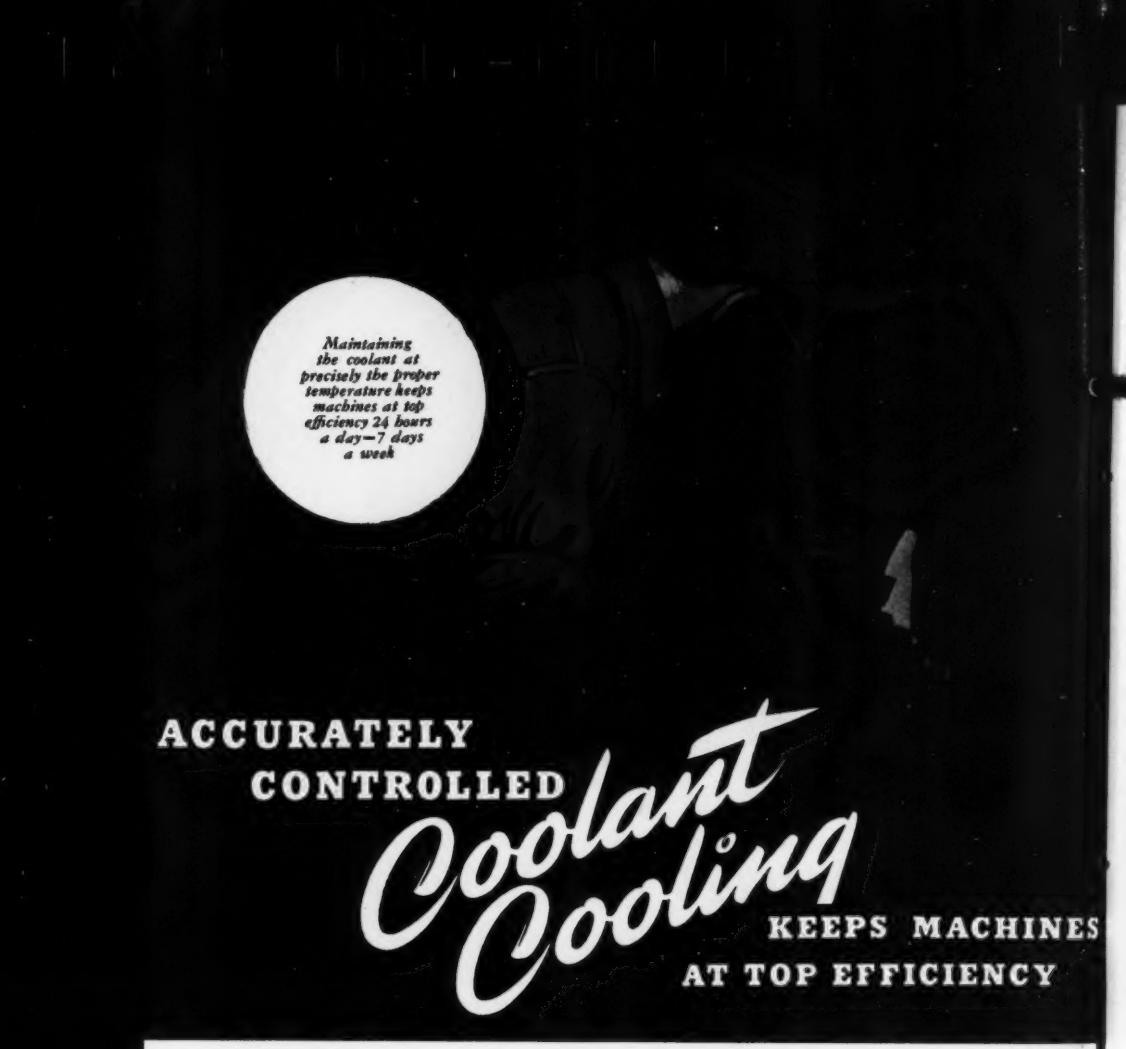
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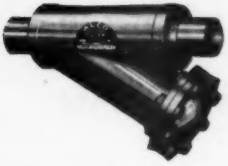
Proper care of Filters and Dehydrators in any refrigeration system will conserve the life of your Alco Valves as well as maintain the entire system to the best possible advantage. Conservation and maintenance are vital considerations today when replacement parts and new equipment may not be available for ordinary uses. Alco suggests the following:

FILTERS and DRYERS



1. Keep filters clean. Dirt in the filter may burst the screen — prevent your Thermo and Magnetic Valves from seating. It also creates a pressure drop and causes "flash gas." The result may be erosion of the pin and seat of the Thermo Valve.

2. Dehydrators should not be left constantly in the system unless of the silica gel type. Drying agents tend to get into the system itself, to plug the Thermo Valve, and are generally injurious if left in too long. The drying agent should be renewed from time to time and both dryers and filters should be of adequate size. Manufacturers' recommendations should be closely followed, as too small sizes cause "flash gas."

These service suggestions are published by Alco Valve Company to help you conserve existing refrigeration equipment and to lengthen its life of useful, efficient service.

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COLUMBUS, OHIO

The Refrigeration Service Engineer

Vol. 10 No. 11

November, 1942

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

A view of shot-testing equipment in an ordnance plant — Designed and built by The Conditioned Air Equipment Co., Minneapolis, Minn. See article on page 62

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago

Telephones Austin 1303-1304-1305

EASTERN OFFICE
420 Lexington Ave., New York City
Telephone Lexington 2-4816

Publishers of Technical Books and Trade Journals Serving the Refrigeration Industries for over 50 years.

Subscription Rates United States $2.00 per year. Single copies 25c. All other countries $3.00 per year.

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The Refrigeration Service Engineer

Vol. 10, No. 11 CHICAGO, NOVEMBER, 1942 $2.00 Per Annum

Automatic Capacity Control Is Provided by Balance Loader System

By S. Charles Segal*

IN many refrigeration systems, there is a definite need for automatic capacity control. This is due to the fact that calculations for design and selections of equipment are based on maximum demands. Actually, the peak load is approached only a small portion of the total operating time. Thus, to obtain satisfactory results at all times, provisions must be made to vary the capacity of the refrigeration system to fit the requirements at anytime.

The following methods have been used in the past to obtain variation in capacity.

A. Use of several compressors.
B. Varying compressor speed.
C. Use of cylinder by-pass.
D. Clearance pocket control.
E. Throttling suction line.
F. Addition of heat.

All of the above modulation methods have definite limitations.

The Kramer Balance Loader System (Patented) is a modulating refrigeration system. It is capable of varying automatically from 0 percent to 100 percent of full load, resulting in a straight line capacity modulation and giving an infinite number of compressor capacity points. The Kramer System will always maintain a fixed minimum predetermined back pressure in the suction line and in the compressor crank case.

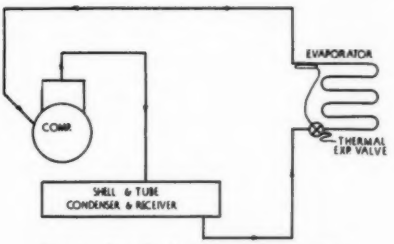


Fig. 1—Standard refrigeration system.

In a standard refrigeration system as shown in Fig. 1, as the evaporator load is reduced, the back pressure will drop. The greater the reduction in heat load at the evaporator, the lower the back pressure will drop. To the standard system of Fig. 1, let us add a balance loader as illustrated in Fig. 2. The balance loader is fundamentally a heat exchanger consisting of a direct expansion coil (A) within a cylinder shell (B). The expansion coil is controlled by an automatic expansion valve (C) set to maintain a

* Kramer Trenton Co., Trenton, N. J.

predetermined minimum pressure. The hot gas from the compressor is passed through the shell of the balance loader before going to the main condenser.

As the heat load at the evaporator (Fig. 2) is reduced, the resulting reduction in suction pressure will open the automatic expansion valve at the balance loader, which will automatically maintain the suction pressure at constant predetermined level. Incidentally, the liquid refrigerant evaporating in the balance loader will pick up heat from the surrounding hot gas, thus in effect acting as a booster condenser to the main condenser.

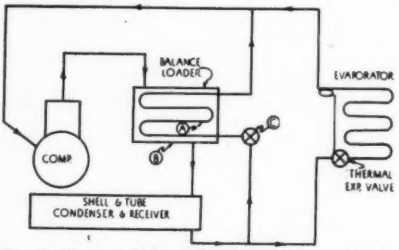


Fig. 2—Kramer balance loader added to standard refrigeration system.

The size of the balance loader will depend upon the amount of modulation required. Its capacity should be equal to the difference between the maximum rating of the compressor and the minimum heat load anticipated at the evaporator. If a cylinder by-pass or multi-compressor system is used, there will be a step in compressor capacities. The balance loader should be selected to cover the full range of the step. The Kramer system can be applied to new or existing refrigeration systems. It can be used in conjuction with air conditioning, industrial cooling, liquid cooling, and commercial refrigeration. It is particularly applicable to systems having wide fluctions of heat load and where precision control is required.

Results from Use of Balance Loader System

Five significant results naturally follow from the use of the balance loader system. They are:

1. Constant back pressure. A constant predetermined suction pressure is automatically maintained regardless of the heat load at the evaporator.

2. Eliminates lubricating and seal troubles due to unusually low crank case pressure. In most compressor designs, too low a suction pressure will cause the twin dangers of seal and lubricating troubles. In this system, partial evaporator capacity will not substantially reduce the suction pressure in the crank case, thus eliminating this type of seal and lubricating failures.

3. Prevents icing of air conditioning coils. When this system is used in conjuction with a by-pass system, or with an evaporator controlled by a modulating expansion valve, the balance loader will prevent the icing up of the evaporator coil by maintaining a fixed minimum back pressure in the complete low side.

4. Permits partial flooding of evaporator through the use of the standard thermostatic expansion valve coupled with a suitable modulating control responsive to temperature or pressure and controlling the amount of refrigerant fed to the evaporator.

5. Close control is achieved; it is limited only by the accuracy of the control instruments.

Applicability of Kramer System

The following illustrations show the applicability of the Kramer system. These illustrations by no means exhaust the possibility of application.

Fig. 2 illustrates the fundamental function of the system. This system will automatically maintain a fixed back pressure in the coils and the compressor crank case under all load conditions within the capac-

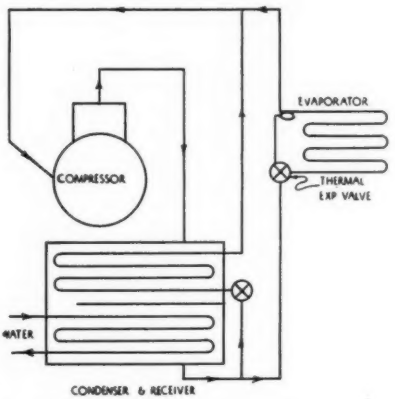


Fig. 3—Kramer balance loader built into water cooled condenser.

ity selection of the balance loader. This system can be applied to air conditioning, industrial cooling, liquid cooling and commercial refrigeration.

The balance loader can be built into a water cooled condenser as illustrated in Fig. 3. Fig. 3 lends itself to a self-contained air conditioning unit; it will tend to eliminate short cycling and sudden changes in discharge air temperature during light loads.

If two or more evaporators are used in conjunction with a single compressor, and if one or more evaporators are cut out (Fig. 4), the Kramer system will maintain a fixed back pressure throughout the system.

If two or more evaporators are used in conjuction with a single compressor and the evaporators operate at individual back pressures (Fig. 5) the Kramer system can be applied by the use of back pressure

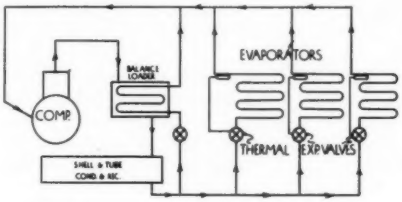


Fig. 4—With one or more evaporators cut out.

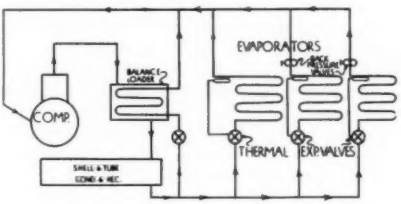


Fig. 5—Kramer system applied by use of back pressure valves.

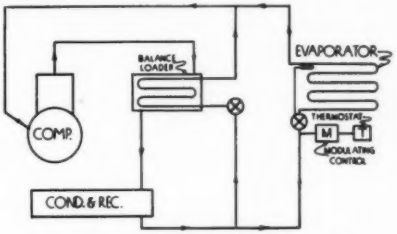


Fig. 6—With modulating control added to expansion valve controlling evaporator.

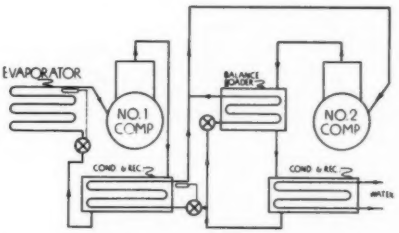


Fig. 7—Kramer system applied to two-stage refrigeration system.

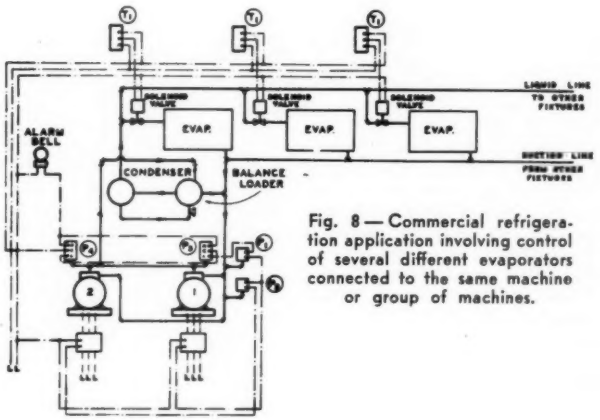


Fig. 8 — Commercial refrigeration application involving control of several different evaporators connected to the same machine or group of machines.

valves in addition to the balance loader. The pressure of the automatic valve on the balance loader is set for the lowest pressure desired.

Fig. 6 is the same as Fig. 2 except that a modulating control has been added to the expansion valve controlling the evaporator.

The modulating control will reduce the effective surface of the evaporator as the temperature of the air within the conditioned area approaches a predetermined point by regulating the flow of refrigerant to the evaporator coil. The evaporator pressure will be maintained constant by means of the Balance Loader. The controlled back pressure of the evaporator will prevent icing of the coil. This same system can be applied to a system using by-pass dampers.

The system as illustrated in Fig. 6 will maintain constant conditions within the conditioned area under varying load conditions. It will eliminate short cycling and intermittent blasts of cold and warm air. The accuracy of control is limited only by the control instruments.

The Kramer system can be applied to a two-stage refrigeration system (Fig. 7). Compressor No. 2 will control the condensing pressure of the low temperature unit (Compressor No. 1) by maintaining a constant back pressure in the low side of compressor No. 2.

Application Involving Control of Different Evaporators

Fig. 8 illustrates a commercial refrigeration application involving the control of several different evaporators connected to the same machine or group of machines. This application is typical of army cantonment or cold storage installations. The thermostats T-1 are of a type containing a three-point mercury switch which will close two distinct circuits when the temperature rises to the thermostat setting. One circuit for each thermostat is connected to the solenoid valve on the evaporator for that room causing it to open when the temperature rises. Simultaneously a second circuit is completed which will energize the compressor starting circuit. Thus when any one thermostat calls for operation, its solenoid valve is opened and a circuit is completed causing compressor operation.

This circuit passes through two high pressure cut-out instruments, P-4 and P-3, which are equipped with alarm circuit contacts. If either high pressure cuts out, the machines are stopped and the alarm bell rings. If the head pressure is at the proper level, the circuit passes to a low pressure cut-out instrument, P-1. Should the suction pressure drop to a point indicating that something is wrong with the system, both machines will be shut down. A second suction pressure control, R-2, is adopted to control machine No. 2 and cuts out at a predetermined suction pressure which will be slightly above the setting of the Balance Loader pressure regulating valve.

Balance Loader in Control

Thus, if only a few evaporators are in operation No. 2 compressor will be cut out and the load will be carried with No. 1 machine. The cut-in point of this pressure control must be higher than the rebalance point in order to avoid short cycling. As additional evaporators may be cut off, there will be a tendency for the back pressure to drop. The balance loader will then come into control keeping the back pressure up to the proper level on all evaporators.

If some rooms are to be maintained at higher temperatures than other rooms on the machines, they should be equipped with suction pressure regulating valves so that the system back pressure will be determined by the requirements of the low temperature room.

S S S

OUR APOLOGIES

ON page 22 of the October issue, in an article written by Harry Alter, reference was made to orphan refrigerators among which was included the Copeland refrigerator. Copeland is definitely not an orphan make and we offer our apologies to Copeland Refrigeration Corp. for permitting their name to be used in this manner. It was an error for which there seems to be no logical explanation.

In a letter received from the author commenting on the error, Mr. Alter states: "Everyone knows, including myself, that Copeland is no orphan. Everyone knows in addition that they make a good refrigerator. I hope that you will publish my apology to Copeland who deserve better treatment from us non-professional writers."

Shop Repairs

Method of Testing Compressor and Pointers on Determining Reasons for Signs of Inefficiency

For the convenience of dealers and distributors, a number of manufacturers have established a flat rate repair charge applying to practically every part or assembly that might at some time require overhauling or a major repair. In many instances the charges quoted make it more practical for dealers to have such assemblies repaired at the factory, especially for major repairs; that is, repairs other than replacing suction and discharge valves and the seal, rather than to attempt such work themselves. It is not only a question of making the repairs themselves but it also involves testing the compressor afterward where the question of equipment comes in.

However, to assist those who may find it necessary to make repairs because of an emergency or because, for some reason, they are not able to take advantage of this service, this article outlines repair procedure applying to compressors, particularly, and the test used thereon.—Editor.

IN THE interest of quick service to the customer, the service man should have available at all times a supply of repaired parts such as compressors, pressure controls and thermal expansion valves that can be installed in place of the original assemblies when it becomes necessary to repair or overhaul the original part.

The original can then be returned to the dealer's shop and overhauled, or to the factory, and either again returned to the installation from which it was removed or placed in dealer's inventory for similar replacement in the future.

Most important of all job repairs is the proper overhauling of the compressor. The compressor is the heart of the machine unit and it is necessary that this particular part operate properly and efficiently. It is essential that all compressor repairs be made to meet the standard test as to volumetric efficiency, operation friction and quietness of operation. The most suitable method that can be used for this purpose is the testing of such compressors on a "pump-up" bench similar to Fig. 1. This particular pump-up bench will accommodate compressors having a bore of less than 1¾ in. A similar pump-up bench should be constructed to test compressors having a bore of 2 to 2½ in.

Compressor Must Be Tested

Regardless of any test made by the service man in the field when the compressor was removed, every compressor that is brought into the dealer's shop, apparently inefficient, noisy, or defective in some other manner, should be tested as outlined above

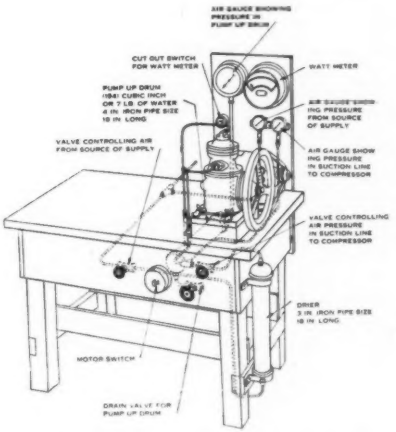

AIR GAUGE SHOWING PRESSURE IN PUMP UP DRUM
CUT OUT SWITCH FOR WATT METER
WATT METER
PUMP UP DRUM (184) CUBIC INCH OR 7 LB. OF WATER 4 IN. IRON PIPE SIZE 18 IN. LONG
AIR GAUGE SHOWING PRESSURE FROM SOURCE OF SUPPLY
VALVE CONTROLLING AIR FROM SOURCE OF SUPPLY
AIR GAUGE SHOWING PRESSURE IN SUCTION LINE TO COMPRESSOR
VALVE CONTROLLING AIR PRESSURE IN SUCTION LINE TO COMPRESSOR
DRIER 3 IN. IRON PIPE SIZE 18 IN. LONG
MOTOR SWITCH
DRAIN VALVE FOR PUMP UP DRUM

Fig. 1—Pump-up bench used for testing compressors.

before any repairs are made. First, the volumetric efficiency (pump-up) should be tested.

In order to determine their efficiency under this pump-up test, it would be well to compile a table, such as that shown in Table 1, in which the number of cylinders, the bore, the stroke, the r.p.m., the pounds per square inch, and the time element is shown. Such a table will act as a handy reference guide to determine the required compressor efficiency. Then the compressor should be tested for noise at various back pressures by operating the valve controlling the air pressure to the suction port of the compressor.

By this valve it is possible to raise or lower the suction pressure over the entire range at which the compressor operates in the field. If either of these tests should substantiate the claims made by the service man, then, of course, the compressor should be dismantled and the repairs started. However, if the test proves the compressor satisfactory, then the service man should reinstall the compressor on the original user's machine unit and investigate further for difficulty which apparently was not due to any compressor defect.

If, after checking the compressor, it is found that it is inefficient, that is, that it does not pump-up in the required time allotted, a test should be made for possible leak at the discharge valve. The compressor should be run to obtain at least 100 pounds pressure in the pump-up drum. The motor should then be stopped. Then, while holding the thumb at the suction port and applying oil at that point, a discharge valve leak will be evident if bubbles appear in the oil. If no bubbles appear, the inefficiency is no doubt due to a leaking suction valve which can be replaced or repaired.

Leak at Suction Valve

To test a leak at the suction valve, mount a pressure gauge in the service port of the discharge shut-off valve, then close the discharge shut-off valve all the way. Start the machine unit and watch the pressure gauge. The pressure should be built up to 150 pounds very quickly and from there on somewhat slower, but in any event the compressor should pump-up to 190 pounds. If, for instance, a pressure of 100 pounds or so is reached and at that point the pressure ceases to build up, it can be assumed that the suction valves are leaking and are the cause of the apparent inefficiency of the compressor.

It no doubt will be found that the trouble was due to foreign matter or sediment under the valve and after the piston head has been cleaned, then polished with Luminox paper and a new suction valve installed in the place of the original, probably no further trouble of the nature will be noticed.

The compressor is then to be assembled. If, after the compressor has operated through at least four complete operating cycles, symptoms still indicate lack of efficiency, the compressor should be taken to the shop and tested on the standard pump-up test and further corrections made if found necessary.

TABLE 1.—TABLE SHOWING VOLUMETRIC COMPRESSOR EFFICIENCY

Compressor	Cylinders	Bore	Stroke	R.P.M.	Lbs./Sq. In.	Time
R-20284, R-20284B	1	1⅜ in.	1 7/16 in.	400	150	3 min. 22 sec.
R-1000B, R-1098, R-1098B, R-1098C	2	1½ in.	1⅜ in.	400	150	1 min. 45 sec.
1-29, 1-45, 1-78	1	1⅝ in.	1⅝ in.	400	150	1 min. 40 sec.
1-77	2	1⅜ in.	1⅛ in.	400	150	1 min. 30 sec.
R-1063B, R-1063D, R-20324, 1-1	2	1½ in.	1⅝ in.	400	180	1 min. 45 sec.
1-41, 1-51, 1-65	2	1⅝ in.	1⅝ in.	400	180	1 min. 15 sec.

Checking Noisy Compressor

If the compressor is noisy but is, from the test outlined above, efficient, it should be dismantled and the part checked that might contribute to such noise. Loose piston pins or connecting rods are the most probable cause of such a condition.

If, after dismantling the compressor, it is found that the connecting rod or wrist pins are loose, the wrist pins can be replaced with oversize ones. The piston pin bearing of the connecting rod should be reamed with an expansion reamer, gradually increasing the size until the proper fit is obtained for a standard .003 in. oversize piston pin. Slight wear at the connecting rod bearing can be taken up by removing a shim at either or both sides.

If, however, the connecting rod has been run without sufficient oil in the crankcase and is scored badly, the entire connecting rod should be replaced with a factory replacement rod. A factory replacement connecting rod is equipped with new bearings at the connecting rod bearing as well as the wrist pin and has been machined accurately both as to the diameter of the wrist pin and connecting rod bore, and as to the center distance from the connecting rod bearing to the wrist pin, which is all important.

In any event, it is not recommended that the connecting rod bearing of any of the more modern compressors be reamed as these are of tough wear-resisting bronze. This metal cannot be satisfactorily hand-reamed and must be fly-tooled in a machine lathe using the proper fixtures for that purpose.

Replacing Crankshaft

On major repairs where a replacement of connecting rods is necessary, it is at times also necessary to replace the crankshaft.

The crankshaft, whether a replacement or the original, should be clamped in a bench-vise. The connecting rod should be clamped into place and adjusted with shims until the proper fit has been obtained. That will be when the connecting rod is just tight enough to fall of its own weight. A connecting rod bearing that is too tight will cause undue friction and increase compressor temperature while one that is too loose will, in a short time, cause a connecting rod tap or knock.

The connecting rods and piston assemblies should be squared perpendicular to the crankshaft. To accomplish this, mount one of the connecting rods on the rear connecting rod bearing of the crankshaft and insert the assembly through the crankcase base, with the bearing plate removed. Then install the bearing plate, then the piston assembly, and proceed to square it to the base face. If necessary, bend the rod. When this is done repeat, using the other connecting rod in the same manner.

Remove Connecting Rod

The connecting rod should then be removed from the crankshaft, the piston end inserted into the cylinder through the bottom of the crankcase and the lower half of the connecting rod bearing again secured into place, using the same shims that were used when the connecting rod bearing was originally fitted.

Piston Head Clearance

By piston head clearance is meant the space between the top of the piston and the valve plate when the piston is at "top center," that is, the end of the compression stroke and the beginning of the suction stroke. The amount of piston head clearance is a very important factor in the efficiency and capacity of the compressor, especially in low temperature work in which the suction pressures are low.

There must, of course, be some piston head clearance in a compressor; the piston would strike the suction valve otherwise. Moreover, some allowance must be made for small amounts of oil. Also, there is some space in the passages through the valve plate to the discharge valves. For best efficiency this "waste" space must be kept to the lowest possible minimum by design and by accuracies and precision in manufacture. Piston head clearance limits of .003 in. to .008 in. may be considered as acceptable in field practice. That is, the top of the piston is permitted to come no closer than three thousandths of an inch from the suction valve and must come within at least eight thousandths of an inch.

Let us see why the amount of clearance between the top of the piston and the under side of the valve plate—this "waste" space—is so important. For example: a two-cylinder compressor having a bore of $1\frac{3}{8}$ in. and a stroke of $1\frac{5}{8}$ in. has a theoretical displacement for one complete revolution of

$$4.825 \text{ cu. in.}, \quad \frac{(1\ 375^2 \times 3.1416 \times 1.625 \times 2)}{4}$$

if we assume no losses (a practical impossibility). Suppose the piston head clearance of each cylinder were $\frac{1}{32}$ in. (.03125"). Then on each top center there would be a space of $\frac{1}{32}$ in. at the top of each cylinder filled with compressed gas that was not pushed over past the discharge valves. When the pistons start back down on the suction stroke, this compressor gas re-expands and causes a pressure to exist in the cylinder and thus tends to keep the suction gas from coming into the cylinder for a full charge of gas. As a consequence each cylinder is reduced in the amount of gas it can draw in and compress by the presence of this trapped gas.

If this compressor were working on a suction pressure (F-12) of 5 lbs./sq.in. gauge (19.7 lbs./sq.in. absolute) and a head pressure of 125 lbs./sq.in. gauge (139.7 lbs./sq.in. absolute) then at the end of the compression stroke and the start of the suc-

tion stroke, the pressure in the cylinder is at least 139.7 lbs./sq.in. absolute, so the suction valve cannot open until the piston goes down far enough that this trapped pressure is reduced by expansion to below 19.7 lbs./sq. in. absolute, so the piston must travel down on the suction stroke almost ¼ in. or 13.7 per cent of the way. During all that time no gas from the evaporator is flowing into the cylinder; the 13.7 per cent of the displacement is practically lost. It is even worse in cases of lower suction pressures, being 18.3 per cent at 0 lbs./sq.in. gauge (14.7 lbs./ sq.in. absolute) and 27.2 per cent at 10 in. vacuum (9.8 lbs./sq.in. absolute).

This compressor (at 125 lbs./sq.in.) would actually stop pumping entirely at a 24½ in. vacuum (2.7 lbs./sq.in. absolute) as it would be doing nothing but "churning" the trapped gas; that is, the trapped gas would simply be expanded and then recompressed and again expanded and would never get out of the cylinder. (In this example, re-expansion due to other spaces such as passages in the plate to the discharge valve have been disregarded for purposes of simplicity and to show the effect of re-expansion due to piston head clearance alone.)

But what does the serviceman have to do with this? Just this: that bearing wear —mains, connecting rods or eccentric rod or pin bushings—allows the piston to "drop," that is, get farther from the valve plate and the piston head clearance is increased (also, the stroke is shortened which decreases the displacement and capacity). Thus, worn bearings are not only objectionable because they cause "knocks" — the compressor is noisy,—but the efficiency and capacity are both reduced. Even though the user may be willing to put up with the noisy operation, he cannot afford to pay for the extra current used in the additional hours of operation required in order to give enough capacity to refrigerate the fixture. In fact, if the loss of efficiency is bad enough, full 24-hour operation may not be enough to hold temperatures.

Substitute for Indicator

The serviceman in the field will not ordinarily have an indicator, which is the instrument used to check piston head clearances, but by laying a straight-edge across the top of the cylinder housing, and with a "feeler gauge," checking the distance between the straight-edge and the top of the piston at top-center, he can check the piston head clearance with sufficient accuracy to enable him to determine whether it is within the .003 in. to .008 in. that may be regarded as necessary for efficient and full capacity operation.

Neither is it likely that the serviceman will have suitable tools and equipment to enable him to rework the compressor to properly locate the bearing holes and relocate the pistons to obtain the proper piston head clearance for efficient operation. He may be able to rework the compressor so that it runs quietly and smoothly but if he leaves an excessive piston head clearance he may not have improved the efficiency and capacity very much, if any. He will usually find it to his advantage and to the advantage of the user to send the compressor to the factory where the use of the proper jigs, fixtures, tools and other equipment makes it possible to rebuild the compressor to the same condition as new, not only as to quietness but also to full capacity and efficiency as well.

"Running In" Operation

If the repairs have been extensive, it will be well to "run in" the compressor at least four hours before making final efficiency and noise tests. It should then be put through the same test as it got when it was new, and it must pass this same test. During this "running in" operation, the suction and discharge ports should be connected together with a suitable piece of tubing to prevent the whipping of air into the crankcase oil.

Leak Testing

When the compressor has proven satisfactory from the above tests, it should be tested for leaks. To do this properly, a nitrogen drum should be connected to the suction port and with the discharge port sealed and at least 125 pounds pressure the compressor should be immersed in a tank of warm water (150° F.). Any leaks, of course, will be disclosed by the appearance of bubbles. This is a most important phase of the repair. Any leaks should be stopped. It should also be checked for capacity and efficiency and tested in a "quiet room" for noise, and also checked for wattage. The various suction and head pressures should be checked and a check made on whether or not there may be a tight bearing or a tight piston. All through the operation cleanliness conditions should be maintained.

COMMERCIAL

INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING *Selling*

War Will Teach Dealers Importance of Service Departments, Says Brandt Electric

By Donald Delayen

THAT electrical appliance dealers following the war will have a much healthier regard for the value of complete service shops is a fact being proven every day during the war, according to A. C. Brandt, head of the Brandt Electric Company, St. Louis.

"In the past it has been the policy of most appliance dealers who sell commercial refrigeration, air conditioning, etc., in addition to domestic equipment to leave the service end of the business up in the air," Mr. Brandt pointed out. "The average dealer going into business right away found out that distributors would handle the service and warranty repairs for him, and that he could escape the detail work by having nothing to do with the maintenance of equipment sold. Thus, he transferred service calls and complaints over to the wholesaler, figuring that he had escaped some ill-will, when actually, he lost a chance to earn a profit on the repair work itself, and still more important, part of the chance to sell the eventual replacement for it.

"Now that the war has stopped all sales of anything but vital refrigeration equipment, dealers are learning the hard way that they should have been selling service work along with the equipment itself from the start. Those who have only recently gone into service are finding plenty of business, but none of the confidence and gracious business which would have been theirs if they had already been servicing and helping along the equipment owner. They see dealers with established service departments taking away what retail sales business exists, and the lion's share of service. The sole reason is attempting to get along in a business founded on good service without it."

The Brandt store, although it is primarily an appliance retail dealership, is an interesting example of the above line of thinking for refrigeration service companies, commercial refrigeration dealers and ordinary appliance dealers alike. Originally the Frank Adam Electric Company, the firm had 35 years of service work behind it when Mr. Brandt and his father took over the business. The first thing done was to reorganize the business on a basis whereby service sells merchandise and vice versa, eleven years ago, a plan which has worked out so well that Brandt Electric Company now services at least twice every appliance, refrigeration equipment item or article it sells, many of them more times.

Brandt's shops are the largest in St. Louis, handling everything but air conditioning work. Back of them lies a simple system of selling both service and merchandise which has reached almost unbelievable heights. For example, Brandt's leads the state in most of its franchised appliance lines, and before the war was selling upwards of 500 washing machines a month, a good part of them completely rebuilt in the repair shops. It sold a national record in electric ranges, more in vacuum cleaners, and a commensurate volume in refrigeration a year ago.

Reason, according to Mr. Brandt, is that the store sells nothing on which it cannot earn a service profit thereafter. In this way there is no such thing as a "completed sale" at Brandt's, because the initial markup profit is superseded at once by service profits which can and do continue until replacement starts the cycle over again. There is no merchandise in the store which won't come back for service, and nothing is sold until the customer has seen the service shops and knows that it will serve her as long as she owns appliances. In this way, the service is the most important phase of every sale.

Shop Covers Second Floor

Brandt's huge shop covers the whole second floor of a downtown St. Louis store building, piled to the rafters with appliances, refrigeration parts, new and old parts and repair equipment. There is no attempt at segregation of services, but the personnel itself is segregated. Among fourteen service mechanics there are six who work on small appliances of all kinds, two on refrigerators, three on washers, two on ranges, two on paint up and clean-up work, two on vacuum cleaners, etc. All men can double up but seldom have to, and are paid an hourly scale high above average. Mr. Brandt recognized that the men who do repairs are the secret of staying in business, and thus has trained every man himself for a specialized job.

The company is franchised for repairs on Manning-Bowman, Hamilton-Beach, Sunbeam, Lionel, Universal and Waring electric appliances in addition to a dozen refrigeration lines, and won every such franchise simply because customers owning this equipment were going to Brandt's for repairs even though there were agency repair facilities already in the city. The fact that all of them were carefully sold on service before the new appliance was delivered took care of that, and good work has completed the job.

Through the war Brandt expects volume to be 90 per cent service, but is not worried about profits. There are enough service jobs coming in to swamp even high-speed facilities like Mr. Brandt's. Since the war started a one-piece service ticket on which the original price is quoted, all service work and parts cost listed, and then returned to the customer. This tells the "whole story" and is certain to bring the customer back in.

"All our volume is built on being able to put every item back in order quickly," Mr. Brandt summed up. "And from the way we are weathering the present storm, it is a foregone conclusion that all dealers will be setting up a service shop after the war—and profiting from it in a dozen different ways."

Twenty Farms Install Milk Coolers on Same Day

ONE of the largest "mass installations" of farm milk coolers ever made in a single day occurred during July at Bellefonte, Pa., when twenty members of the Pennsylvania Dairymen's League accepted installation at once. The coolers went on to every farm equipped with electrical current service among the membership, and will be followed up with ten more as soon as proposed REA current is supplied, according to the association.

The installations were made in the interests of the war effort milk supplies and to modernize all dairying by members, according to J. B. DeHaas, who installed all 20 of the units. Along with the coolers, most dairymen operating electrified farms have purchased electric milking, sterilizing and churning apparatus.

Liquor Store in Wine Market Is Growing Field for Refrigeration Dealer

By Robert Latimer

"THE most simple means by which the refrigeration dealer specializing in commercial walk-in boxes, storage coolers, etc., can make himself successful is to add to the income of the merchants he sells." Those are the words of J. Wesley Young, president of the J. Wesley Young Company, Denver, Colorado—a commercial refrigeration dealership which has specialized for several years in ferreting out unusual markets for refrigeration, and "making them pay" for the owner.

Mr. Young, a General Electric dealer and service expert for more than fifteen years, has acquired an unusual reputation in the Colorado capital for the versatility of his refrigeration designs—including special installations for everything from a blood bank to a gigantic cooler for the Army Air Force in which aviation oils are tested. He has developed most of his sales by spending at least two days a week looking into the operation of retail businesses, and uncovering specific refrigeration possibilities to help the latter.

Wine Market Growing

A typical field which Mr. Young has found burgeoning rapidly is the wine market—which promises to be among the most important of American industries following the war, as American drinkers turn their taste to the domestic product to replace the imports of the past twenty years. American wines now are among the best made in the world, and the industry as a whole has seen an increase of more than 100 per cent in a few years' time. Retail dealers are going to have to supply chilled wines, Mr. Young points out—and consequently, every liquor store will be in the market for specialized refrigeration of the kind.

One such system was installed by Mr. Young in Ted's Liquor Store, Denver, to increase the sales of chilled wine, beer, etc., more than 50 per cent in a single year, and to pay off a $600 refrigerator within a year and a half. Mr. Young found this liquor store operating only a few doors away from his own office—near to an exclusive residential district in which many wine buyers traded with the store. He "sold" the owner on the use of refrigeration by dint of simply dropping in every day and suggesting it. The store was located excellently to get chilled wine business, but because of the small size of the building, had felt it impractical to install a large refrigerator. However, Mr. Young surveyed the square footage, and pointed out to the management that a large storage cooler could be built in the back, opening into the central partition, without losing an inch of sales space, or crowding the store in any way. When this was pointed out, the owner bought—and Mr. Young sold a $600 installation which is one of the most unique in the city. It measures six feet and seven inches by eight feet, and is large enough to accommodate around 75 cases of beer and wines without crowding. Built of heavy oak with cork insulation, it is equipped with four glass service doors at the front, through which customers entering the store can see orderly rows of wines and beer on display—under a cold fluorescent tube which does not interfere with the refrigeration. When a customer walks in with a jaded taste, and wants "something different" to drink it is easy for this liquor

store to point to the 36-degree chilled wines behind the glass, and suggest that he give them a try. Also, case orders from inveterate wine drinkers can be now delivered chilled to the proper temperature, something which immediately gave the liquor store a large amount of banquet and entertainment business which it could not handle before.

Special metal shelves were built inside the box to permit stocking of split cases and half cases of wine and beer ready for sale when the customer asks for larger amounts. Single-bottle trade is filled through the doors, of course, and a new cold bottle pushed into place from behind as the sale is made. Whenever a liquor store clerk goes inside the refrigerator through the walk-in entrance at the rear, he pushes the stock forward and refills the shelf from the back in order to keep the display attractive and save time during rush periods. Cases are stacked in the center, allowing cold air from a General Electric cold-diffuser mounted on the ceiling to circulate freely around them. Coils used are entirely self-defrosting so that no trouble is involved in use of the box, and a thermostat automatically maintains the temperature of 36 degrees in the refrigerator—proper for sherry wine, clarets, white wines, port and white port which are recommended by the Wine Institute for chilling. This novel installation, which was made in a few days, put this Denver liquor store "on the map" with fastidious wine buyers—and immediately created a dozen more similar orders for the refrigeration firm. Mr. Young is continuing to make sales of this kind despite the war, and feels that there will always be similar markets open to the aggressive refrigeration service engineer willing to devote enough time to running them down.

Specialization in Realty Company Service Has Paid Missouri's Oldest Refrigeration Service Firm

By Bert Merrill

IT takes specialization of the highest type for the refrigeration service firm to keep its head above competition. Those are the words with which Harry D. Schnieder, owner of the Ace Refrigeration Service Company, at St. Louis, Mo., sums up the merchandising principles of his business. Ace Refrigeration Service Company is one of the largest such organizations in St. Louis, and the oldest, having been founded 18 years ago.

Since 1922, Mr. Schnieder has specialized exclusively in refrigeration service for realty companies, which includes every operation from the maintenance of multiple refrigeration systems in apartment houses, to large-scale repairs on commercial air conditioning equipment. When he entered the field, domestic refrigeration was comparatively new, and Schnieder immediately chose the apartment-house service field as the one capable of producing the greatest amount of business. That he was right has been demonstrated by the fact that the Ace books have shown a business increase each year for the total 18.

Now employing eight service men, the company specializes in stoker service, maintenance service, and a special bracket or refrigerator service for the owners of large apartment houses, many of which run over 60 boxes. It handles all city high school refrigeration in school cafeterias, and a great deal of the city's hospitals and other institutions work. Service men handle from ten to fifteen calls a day, as an idea of the continual pressure this specialization has brought about.

Formerly, when all apartment houses were built with multiple refrigerator service, Schnieder made each deal on a con-

tract basis guaranteeing perfect operation of the multiple system on a flat rate. Now, however, when all apartments have individual boxes, service work is charged off individually to each box. Because of his long reputation in the field, Schnieder gets first call, and has a list of more than 550 apartment house owners as "regular customers."

"When we first went into business," he explained, "refrigeration service was so new that we had to make most of our own parts. We owned a shop which could turn out compressor heads, valves, and all essential parts almost by hand, so difficult was it to obtain them from manufacturers. Thus, we were the only service company in many instances which could supply parts when a breakdown occurs, and we have built a good part of our business on that past service."

The old dies, stamps, lathes, and other tools which Schnieder used for this purpose are still in the shop. Now, however, Ace maintains a $7,000 inventory of parts for all types of domestic refrigerators, and commercial refrigeration. The name "Ace" was chosen for a preferred listing in the telephone book. Each year, Schnieders order 2,000 reprints of the telephone page on which his directory ad appears, pastes this up on a cardboard square, and mails it around to all potential customers, pointing out that any refrigerator need can be answered by dialing that number.

Direct mail is used every three months to the entire customer list of apartment house owners, pointing out the desirability of a frequent checkup, and asking again for all service work. Schnieder last year purchased over 400 used refrigerators, taken out of apartment houses. These, he reconditioned in his own shop and sold from the floor of a hardware store operated in connection with the service. More are sold for junk, or to other refrigeration service firms. Because he supplies so much apartment-house service, most such boxes taken in are 6-foot size, which he finds readily salable at a profit of around $5 each. Twenty-four hour service is offered all apartment house owners, a feature much appreciated.

The back seat of each service man's car has been remodeled into a neat parts cabinet. Each service man is issued a car stock of approximately $200 in parts, at the first of each month. Parts bills, service, and other income is thus paid monthly. In this way each service man is actually an independent business man, and is able to build up his own service.

"Ten Commandments" for Employees During Wartime

GETTING 100 per cent cooperation of employees in production and efficiency has been boosted at a western refrigeration manufacturing plant since the management posted "Ten Commandments For Workers" which were evolved by the employees themselves.

The "Ten Commandments" are reproduced on a 6x6 foot sign suspended in the center of the shop and reads—

I WILL DO THE JOB

1. By keeping my mind and body in healthy condition.
2. By starting my day's work on time and making good use of every minute in the day.
3. By taking no time off for personal reasons.
4. By working safely—protecting myself and my fellow workers.
5. By carefully protecting all work and materials entrusted to me.
6. By telling the boss of faster and better ways of doing the job.
7. By helping my fellow workers and other departments to keep their work up.
8. By seeing that no one damages or destroys any of my good work or that of my fellow workers.
9. By not listening to rumors or letting defeatists discourage me or slow my work down.
10. By working with the conviction that my individual effort will win this war.

The lettering was done in red on a white background, and has gone a long way toward keeping up employee morale, according to the management.

The Refrigeration Service Man—His Part in the War Effort

Responsibilities of Keeping Equipment Running. Extemporaneous Remarks at State Convention of Illinois R.S.E.S., Springfield, October 18, 1942

By HERMAN GOLDBERG

I WAS happy to learn of the decision of your officials to hold the annual Illinois state meeting of The Refrigeration Service Engineers Society. To me this was a good indication that this Society is proving itself willing and ready to work under present war time conditions with whatever tools or materials may be available. This meeting, I am sure, is ample proof that the refrigeration service man intends to do his best in his vital role of keeping present refrigeration equipment running.

I have had the privilege of speaking at various Refrigeration Service Engineers Society meetings during the past six weeks and I have talked to service men not only around Chicago but also in Kansas City, Des Moines, Milwaukee, Davenport and now in Springfield within a relatively short period of time. While I have not come with a prepared speech, I believe you may be interested in the various problems brought forth by service men in other territories and my own personal reactions to these problems.

The Industrial Position

Before I go into that however, I think it might be well to portray our industrial position because of our tremendous all-out war effort. We must bear in mind that war causes a vast amount of dislocation. In order to make my thought clearer let us imagine a series of earthquakes and fires in all the principal cities of the country at the same time and estimate the effect upon the working personnel of the various industries while these earthquakes and fires are raging. We would not expect anyone to try to conduct business as usual and we certainly would consider it a crime if anyone were to try to make commercial profit out of such a circumstance.

Whether or not we wanted to go to war doesn't seem to be the question with us. The fact remains that war was declared upon us and we either had to fight immediately or take the consequence of being a secondary power to an alien people. Needless to say, we are in this fight to win and to win decisively. It must be understood that the going will be tough for us as a nation, but there are already indications of the wonderful strides we have made in producing the necessary tools of war to win ultimate victory.

Abuse of Criticism

I have felt it necessary to give you this brief background and tie-in of our national war effort because at various times we all hear talk about what ought to be done in Washington. This right of expression is a grand American privilege and is one of the things which we are fighting to retain. However, at times during a critical war period it can be abused. From time to time you may have heard some derogatory remarks about the various agencies which have been established in order to conserve and utilize the materials necessary, first for war and second, for essential civilian needs.

It is a simple matter to criticize and accept criticism of other people's activities as fact. However from my own personal contacts with the various men in different war agencies, I have come to the firm conclusion

that these men are doing a remarkable job in spite of a lot of conditions about which most of us have little knowledge. You must bear in mind that we have been engaged in this war hardly more than nine months. During these nine months we have not only drawn thousands of men from various industries to do the best job possible in Washington, but we have also drawn them from different parts of the country, away from their families and in many instances have placed them in work foreign to their civilian experiences.

The point I am trying to make is that the WPB man in Washington is just as human as you are and while at times it may seem that there are some inequities, I believe these are being reduced rapidly because the men who have been on their jobs now, in Washington, for a number of months have become more accustomed to the different conditions and more important of course, to the various duties to which they have been assigned. As Americans we are great believers in team work. The time is rapidly approaching when the various agencies and the individuals in these agencies will function as a tremendous team toward one goal of defeating our enemies in the shortest time possible. The sooner we win this war the less expensive it is going to be to us in men and materials.

Recognition of Industry as Essential

The questions which usually are asked of me during these meetings are whether WPB recognizes the refrigeration industry as essential, whether parts and materials will be available for repairs and maintenance, whether the government recognizes the essential need of the individual service repair man, whether it is better for a service man to stay on his job or take a position in a more direct war industry, whether the government is interested in keeping current running refrigeration equipment in existence and whether the government recognizes the refrigeration service man as being of any value at all in his locality. I could run on with a lot of questions of similar nature, but I suppose you fellows will also have some of your own during this meeting.

First, let us see how the government men themselves view us and what they may expect of us. I think their picture of us is simply this—that they can rely upon the men in repair and maintenance of refrigeration equipment to do the best they can with whatever can be allowed them in the way of materials. Second, they expect everyone to use common sense. Certainly the repair and maintenance man of refrigeration equipment should use his. It stands to reason if your cause is worth while and if there is a necessity during this war period for your services, eventually your problems will be taken care of in Washington after more important needs toward winning the war are handled.

Frankly I feel that more consideration will be given the service men for parts as time goes along because the need of keeping present equipment in running condition is very essential to the nation today, in relation to our overall war economy. Certainly, it is economical to keep equipment running for the minimum amount of material costs which will take care of this need. I think it is good economy to preserve as much of our national food wealth as possible through refrigeration and to prevent a loss of this food wealth by keeping systems from breaking down.

Utilizing this economy, we also economize on men in the field and men in shops who might become ill through food spoilage. I think also that it is good economy to keep the nation's food supply fresh because so many of us are engaged in work at hours foreign to our previous occupations. Then too, where both the man and his wife may be engaged in war activities it is not only cheaper financially to have good refrigeration equipment available to them, but also good policy from a national standpoint to see that they are kept in good health through wholesome foods.

War Demands Come First

In my opinion our government officials recognize these needs for the maintenance of present refrigeration equipment. However, as vital as these needs may be and regardless of how clearly they recognize them, it is necessary for government men to divert materials which are needed immediately in our armament program. Certainly these materials must go to the more direct war effort. It is our duty to understand these needs and to be patient.

Please bear in mind that I am not quoting anyone. These are merely my own observations. I do feel, however, that the refrigeration service man is regarded as an essential part of our war time economy structure. Wherever you fellows find that your ranks are thinned because service men have gone into better paying jobs in other indus-

tries, I think it might be your patriotic duty to stay right on your job, giving your service to as many people as you possibly can, in order to maintain their refrigeration equipment to the best of your ability even when you may not be able to get materials or tools.

Individual Ingenuity

There is one thing that you have which no amount of rationing can increase or decrease, and that is your own ingenuity. It is necessary for you to use your ingenuity and skill in combination with whatever the government can allow you to do your job. Bear in mind that your job with or without material is relatively simple and certainly a good deal less dangerous than that of your own flesh and blood or friends now actively being trained or already in physical combat with the enemy. Reducing it to a personal issue as to whether you as individuals would demand an extra valve or whether the material for that valve should go into the fighting equipment, I know that you would do without the extra valve. We must look upon this material example multiplied a million times over.

I cannot urge you too strongly to use common sense as to whether your services are more valuable in your present locality or on a new job. I repeat that you should use common sense and keep your obligation to your community in mind if there are not enough repair men to take care of the present equipment. This problem is one for the government to decide. I believe we may get instructions at some future date on the various rulings covering manpower allocation. In a sense you are as valuable to your community as your local physician. Large numbers of our doctors are in the armed forces and many in retired or semi-retired positions are again taking care of illness. It hardly seems right that we should add more burdens to some of these gallant doctors by merely changing our posts because of compensation.

Rising Costs

I believe I have talked quite a bit, however, before I close I wish to call your attention to rising costs and, of course, taxes which are a part of our existence today. If you wish to take my advice buy bonds with every nickel you can put your hands on and don't buy a whole lot of unnecessary trinkets or luxuries because the other fellow is breaking his back to get them before they are sold out. Aside from the patriotic motive, it is going to be an excellent thing for you fellows to have bonds in the bank when this war is over. You are not getting any younger and through your own experience you undoubtedly have found that a dollar in the bank can prove a very valuable friend. Yet I have never known of any dollar bill which could increase in value when placed away in a vault. However, a war bond can grow in value, and aside from the money which the government will procure to conduct the war, through your purchase, I cannot think of anything better for your own personal benefit.

The Future of Service

There seems to be some concern among service men about their place in the future, especially after the war. I do not think you should worry about this particular angle because it will take some time after the war for all of the manufacturers to get back into production on new units, and it will be your job for quite a while after peace is declared to keep equipment running until new jobs can be made for replacement and for new installation. Also, I think you should bear in mind the new applications that have come into the refrigeration and air conditioning field during recent months, especially pertaining to industrial refrigeration. This new phase cannot help but lead to more opportunities for the men in the service field. Do your best to keep the refrigeration equipment in your community in good performance regardless of various handicaps. In the long run you will be rewarded by the full knowledge of a job well done.

I wish there was some way that men of your kind could be given certain marks of honor or recognition for your personal sacrifices but this, of course, is one of the things that cannot be. If you people who are engaged in essential civilian duty cannot receive official recognition, I think you certainly can receive recognition from yourselves by knowing that you have done exceptional work under trying conditions and that by doing your best on your jobs you are performing a national service.

As I said earlier, I believe one of the essential things the government expects us to have is common sense, and I am sure that the refrigeration service and maintenance men of this country will not fail our government.

New Price Regulations Outlined in Circular Issued by OPM

A CIRCULAR giving up-to-date information on the new price regulations has been issued by the Office of Price Administration. Because it applies so directly to the refrigeration service field, the information in tabulated form is published on the two following pages.

As previously stated, on April 28, 1942, the Office of Price Administration announced the General Maximum Price Regulation which fixed the highest March prices as the ceiling for nearly all commodities and services which American people eat, wear and use. This broad price ceiling became effective for manufacturers and wholesalers on May 11, for retailers on May 18, and for services on July 1.

After further experience with this regulation, it was decided to issue a separate price regulation designed to meet the special needs of businesses in the service field. This regulation (No. 165) which replaces the General Maximum Price Regulation, was issued on June 23. It became effective July 1 and it is in accordance with the provisions of this regulation that the prices charged by most service businesses in the country are controlled.

Reason for Price Control

Price control was found necessary primarily because the Nation is at war—the biggest war the world has ever known. Price control is a part of that war just as much as the building of tanks and the bombing of Berlin. It can keep the cost of tanks, guns and planes from doubling. That is important to citizens because they have to pay taxes and buy bonds to build the war machines.

"You have a big part to play in making price control work," the circular continues. "If you don't realize how important price control is, ask yourself if you would like to pay $1.00 for a loaf of bread, $25 for a pair of shoes, $200 for a new suit. Ask yourself if your customer would pay $30 for a laundry bundle, $25 for a car oil change, $25 to have a suit cleaned and pressed. Remember that the services you sell are important items to your customer's budget. Remember that he is counting on you to keep your prices down."

Should Know Responsibilities

All Americans are urged to know their responsibilities under the law and to live up to them. This digest has been written as a guide to help in the observance of this important law.

The following are important dates which all those who come under the jurisdiction of this law should mark on their calendar.

Starting July 1, no more could be charged for any service than the ceiling price as established by OPA regulations. Records must be kept showing prices charged in March, 1942, for all services. Every piece of writing or printing which will help to show what the prices were in March should be kept. If it has been the custom to give each customer a receipt, this should be continued. Even if customer receipts have not been given in the past, a receipt must be given to any customer who asks for one.

On and after September 1, a statement showing the following must be kept in the store:

(a) The highest prices charged for services supplied during March, 1942, for which prices were regularly quoted in that month.

(b) A description of each of these services so complete that any person could identify the services.

(c) The pricing method, if any, regularly used during March, 1942.

(d) All allowances, discounts and other price differentials which were regularly allowed during March, 1942. This statement must be shown to any person who asks to see it during ordinary business hours.

A copy of the statement of prices mentioned above must be filed with the nearest War Price and Rationing Board. (This was due September 10). If the location of this Board is not known, the local newspaper, post office, trade association or chamber of commerce will know. If a new business is opened or a new service offered, a similar statement must be prepared within ten days and filed within 20 days.

HOW TO FIND YOUR CEILING PRICE FOR A SERVICE

The following ways of finding your ceiling price must be used in the order listed. That is, use No. 2 only if No. 1 won't work, and use No. 3 if neither No. 1 nor No. 2 will work, etc.

If this is the case	Then your ceiling price is
1. If you regularly figured your prices in March 1942 by using a rate, or a pricing method and charges, and the service you are pricing was ordinarily priced by using that rate or pricing method, in March 1942.	**1.** The price you figure by using the highest rate, or the pricing method, including the highest charges, you used in March 1942. In other words you must charge no more now than **you would have charged in March.** You must not charge more for labor or materials than you did charge in March, nor may you add a larger percentage for overhead or profits.
2. If you did not regularly use a rate or pricing method in March 1942, but **you did supply the same service** then.	**2.** The highest price you charged to the same sort of customer in March 1942.
3. If you did not regularly use a rate or pricing method in March 1942 and did not supply the same service then, but you **did offer to supply** it in that month.	**3.** The highest price at which you offered to supply that service to the same sort of customer in March 1942.
4. If you did not regularly use a rate or pricing method in March 1942 and did not supply or offer to supply the same service then, but you **did supply a similar service** in that month. (A "similar service" means one having the same use and purpose and ordinarily supplied at the same or nearly the same price.)	**4.** The highest price which you charged to the same sort of customer for the similar service in March 1942.
5. If you did not regularly use a rate or pricing method in March 1942, and you did not supply the same or a similar service or offer to supply the same service then, but you **did offer to supply a similar service** in that month.	**5.** The highest price at which you offered to supply the similar service to the same sort of customer in March 1942.
6. If you cannot find your ceiling price by (1), (2), (3), (4) or (5), because you did not use a rate or pricing method and you did not supply or offer to supply the same or a similar service in March 1942.	**6.** The ceiling price of your closest competitor (found as in (2), (3), (4) or (5) above). If your competitor regularly figured his prices in March 1942 by using a rate, or pricing method and charges, for the same or a similar service, you may also use that rate, or pricing method and charges, but only for such services. (Your closest competitor is the man with the business most nearly like yours who is located nearest to you. He is the man from whom you might take business or who might take business from you.)
7. If you cannot find your ceiling price in any of the six ways above.	**7.** A price not more than you would have charged for the service if you had supplied it in March 1942. (This price must be found by using the rate or the pricing method and charges which you regularly used for any service you supplied in March, but must not be more than the sum of the three following items: (1) The cost of direct labor used in supplying the service, but you must figure this out using wage rates no higher for each type of employee than you paid in March 1942. If you had no such employees, use the wage rates your competitors paid such employees in March 1942. (2) The cost of materials used in supplying the service, but you must figure this out using prices for materials no higher than the ceiling prices set by OPA for purchase of these materials by you. If no such ceiling prices have been set, then use the prices that you or buyers like you had to pay for these materials in March 1942. (3) The margin over the cost of direct labor and materials, figured as a percentage of that cost, so as to be the same percentage margin that you secured in March 1942 on the service which accounted for more of your business than any other service you sold. From this total sum you must subtract any discounts or allowances that you gave in March 1942, to the same sort of purchaser. You must fill out Form 265.1 and report every price found in this way to your district or State OPA Office.)

Tabulated information on how to find ceiling price for a service under new price regulations.

If this is the case	Then your ceiling price is
8. If you can find a ceiling price by one of the seven ways above, but in past years you have regularly charged different prices for the same service in different seasons of the year.	**8.** For each season, the highest price you charged for the service in the corresponding season of the year before March 1942 plus a percentage increase in that price. The percentage increase is found by using the table given in (9) below. Take the date at the end of each season whose last day fell within the year before March 1942. Find where that date falls in the left-hand column. Use the percentage opposite in the right-hand column. Add this percentage of your highest price in the corresponding season in the year before March 1942 to that price. This will give you your ceiling price for each season separately. You must report each price found in this way to your district or State OPA Office, using Form 265:2.
9. If the service you are pricing is one you performed regularly during only one season of the year preceding March 1942, and you did not perform it in March 1942.	**9.** The highest price you charged for the service in the period during which you last performed it, plus an added percentage of that price as follows: If you last performed the service between the following dates: — Then you may add the following percentage to your highest price during that period:[1] Mar. 1–Apr. 14, 1941 — 12.9% Apr. 15–May 14, 1941 — 11.8% May 15–June 14, 1941 — 11.1% June 15–July 14, 1941 — 9.3% July 15–Aug. 14, 1941 — 8.5% Aug. 15–Sept. 14, 1941 — 7.6% Sept. 15–Oct. 14, 1941 — 5.7% Oct. 15–Nov. 14, 1941 — 4.6% Nov. 15–Dec. 14, 1941 — 3.7% Dec. 15, 1941–Jan. 14, 1942 — 3.4% Jan. 15–Feb. 14, 1942 — 2.1% Feb. 15–Feb. 28, 1942 — 1.2% **Note** [1] You must fill out Form 265:2 and report every price found in this way to your district or State OPA Office.
10. If the service you are pricing is seasonal and should be priced under (8) or (9), but you did not perform the same or a similar service during the year before March 1942.	**10.** The ceiling price of your closest competitor for the same or a similar service, as determined under (8) or (9). "Closest competitor" is defined in (6) above. "Similar" is defined in (4) above. You must report every price found in this way to your district or State OPA Office on Form 265:2.
11. If you cannot price the service by any method described above. (This is a very rare case.)	**11.** One which you determine yourself and report to your district or State OPA Office on Form 265:3, explaining how you arrived at this price. Your price will be subject to disapproval at any time by the Office of Price Administration.
12. If you gave any discounts or allowances or special low prices to any class or kind of customers in March 1942.	**12.** Then you must keep on giving at least the same discounts, allowances, or special low prices to the same kinds and classes of customers.

May you ever charge more than your ceiling price? No. You may, however, apply to the OPA for adjustment of your ceiling prices, but only in cases provided for in Sections 1499.114 and 1499.115 of Maximum Price Regulation No. 165. If you have any question about adjustments, get in touch with your District, State, or Regional Office of Price Administration Office. You cannot charge more than your ceiling prices until OPA has entered an order permitting you to do so.

This pamphlet is merely a guide to help you. It is not a substitute for Maximum Price Regulation No. 165. The Regulation establishes your legal duties. In order to protect yourself you must familiarize yourself with its provisions.

This special price regulation has been issued by the Office of Price Administration to meet special needs of the refrigeration service field—Information for using the above tabulation is shown on previous page.

Service "GENUINE DETROIT" Flashes

VOLUME 6 DETROIT, MICH.

Published in the Interest of Equipment Conservation through More Effective Servicing

Feeler Bulb in Wrong Location—Expansion Valve Leak—Evaporator Too Small

FEELER BULB IN WRONG LOCATION. **Bulb should be clamped to suction line at end of coil and must be unaffected by room temperature. Use sufficient drier tubing between bulb and outside air to prevent heat from flowing into the bulb and forcing the valve open during the shut-down period.**

Where several coils connect into a header, the connections between bulbs and header must be long enough to prevent one coil from affecting the others.

Where an air current flows over the bulb it should

Trouble of this nature often shows up with a

ing valve will cause the evaporator to fill up during the off-cycle and flood over at the start of the on-cycle.

Detection:

After checking bulb location, adjustment, and possibility of freezing, remove the valve and have it checked for tight shut-off.

EVAPORATOR TOO SMALL. **When evaporator is too small or air flow over evaporator is insufficient, it causes low suction pressure, insufficient refrigeration, long running time and excessive**

Detection:

others.

Where an air current flows over the bulb it should

cient, it causes low suction pressure, insufficient refrigeration, long running time and excessive

Trouble of this nature often shows up with a change in the outside temperature. An improperly placed feeler bulb may get by unnoticed during mild weather and then cause a flood back during hot weather. Also, the job may be satisfactory during hot weather and an improperly located bulb cause starving of the coil during mild weather.

EXPANSION VALVE LEAK. The expansion valve should close during the shut-down period. A leak-

Detection:

A. Make sure that evaporator is completely refrigerated.

B. Check air flow for obstruction.

C. Check pressure control for proper cutout point.

D. Check load against manufacturer's rating for evaporator.

A complete Service Analyzer, giving many helpful hints, will be sent upon request.

SYMPTOMS					PROBABLE CAUSE
Condition of Job	*Evaporator Condition*	*Running Time*	*Suction Pressure*	*Suction Line*	
Normal or Cold	Flooded	Too Long	Normal or High	Flooded	Feeler Bulb in poor contact, or in wrong location
Normal or Cold	Flooded	Too Long	Normal or High	Flooded	Expansion Valve Leaks
Warm	Cold	Short Cycle	Low	Normal or Cold	Evaporator too small or air flow over evaporator obstructed

DETROIT LUBRICATOR COMPANY

General Offices: DETROIT, MICHIGAN

Canadian Representatives: Railway & Engineering Specialties Ltd., Montreal, Toronto, Winnipeg

War Production Activity

A Survey of What Leading Refrigerator Manufacturer Is Doing to Produce War Materials

DURING the last war Engineer George Mason headed operations at the famous Rock Island Arsenal. Today, as president of Nash-Kelvinator, he is running a bigger "arsenal" of his own.

When it reaches peak production on current assignments, Nash-Kelvinator will be producing at an anuual rate of four to five times its normal peacetime business, when it built a half-million automobiles and refrigerators a year.

Most of the company's work is in the aircraft field, and it is the only company building all three of the major products of United Aircraft, Vought-Sikorsky Flying Boats, the Hamilton Standard Hydromatic Propellers and Pratt & Whitney Airplane engines.

In releasing a summary of current operations, Nash-Kelvinator paid high tribute to United Aircraft, declaring that the energy and wholehearted cooperation of this company was responsible for much of the rapid progress made by American industry in the production of war materials during the last year.

Nash-Kelvinator war activities were outlined as follows:

Flying Cargo Boats

With much of the tedious makeready period over, the great fleets of gigantic flying cargo boats will soon be sailing off Nash-Kelvinator assembly lines, "somewhere below the frostline" . These cargo carriers, said to have the longest range of any aircraft of their type, will be built in a "chain" of the company's plants in various parts of the country. Built for the U. S. Navy, the boats will be virtual duplicates of the Vought-Sikorsky's already in trans-ocean service, one of which recently set a new westbound Atlantic crossing record of less than 20 hours under heavy load.

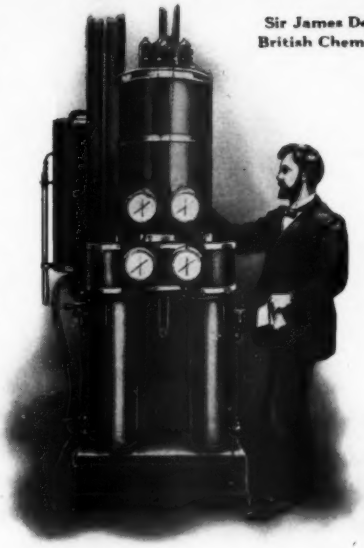
Although specific information in regard to their construction is restricted, some indication of their size can be gained from the fact that the pontoons alone are nearly as large as the fuselage of the average pursuit ship. Parts and subassemblies of these great flying ships will be built in the company's former automobile body plants, while others will be fabricated in its refrigerator cabinet plants. They will be assembled in quantity in an entirely new plant now nearly completed. The Navy plans to use the flying boats to transport war materials and men to the far-flung action-fronts of the United Nations.

Hydromatic Propellers

With the thoroughgoing cooperation of United Aircraft, Nash-Kelvinator was producing intricate Hamilton Standard hydromatic propellers within 30 days after Pearl Harbor. This was the company's first assignment in the aircraft field. Two unused automobile plants in the midwest were selected by the Defense Plant Corporation for the production of the propellers by Nash-Kelvinator, which immediately sent its engineers to United to study its mass production methods. While the plants were being rehabilitated, key men were being trained right at the homes of these famous propellers. Seven months after the dust was first shovelled from these plants, props were spinning off the production lines.

No part of the modern fighting plane requires more execting standards or greater manufacturing skill than these precise Hamilton Standard propellers. Pitch of the huge blades is controlled by an infinitely precise hydraulic mechanism. Half the thickness of cellophane is greater than the

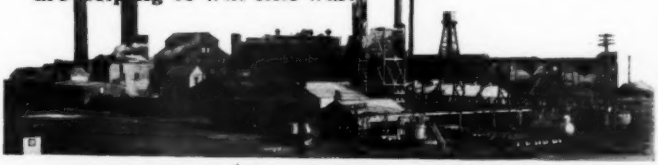
REFRIGERATION HAS COME A LONG WAY



Sir James Dewar—1842 1923
British Chemist and Physicist

1892 Dewar excited the scientific world with his then massive refrigerating machine—it weighed 3 tons and contained 3,000 feet of pipe. The Dewar Flask, basic principle of the modern "Thermos" or vacuum flask, was an outstanding contribution to the technique of low temperature research.

1942 To help win this war is the immediate and compelling task of all of us. To maintain Virginia's high standards of perfection and to deliver Virginia Refrigerants promptly to the points where they are needed is "Virginia's" prime contribution to that effort. "Virginia" Research, Production and Delivery are at the command of all refrigeration engineers whose efforts are helping to win this war.



General View of Manufacturing Plant at West Norfolk, Virginia

"VIRGINIA" REFRIGERANTS
AGENTS FOR KINETIC'S "FREON-12"

VIRGINIA SMELTING CO.

WEST NORFOLK, VIRGINIA

average tolerance permitted in the careful machining of the hundreds of parts that make up the propeller assembly. So delicately balanced is the assembled propeller it will literally turn with a breath in its testing rack, although it weighs over 400 pounds.

At the request of the Army, two Nash-Kelvinator props and two Hamilton Standard "originals" recently were disassembled and the parts scrambled. The parts were interchanged at random and two "mixed" propellers assembled. The resulting props balanced perfectly, showing the complete interchangeability of the propeller parts manufactured by these two companies, a fact of vital importance on the fighting fronts. These propellers are now being turned out in quantity in one Nash-Kelvinator plant, while a second plant is ready to swing into production shortly.

Two-Thousand HP Engines

In another Nash-Kelvinator plant, the company will soon be turning out mass quantities of huge Pratt & Whitney 2,000 hp high-altitude engines. These turbo-supercharged, double-wasp, air cooled engines, said to be the most powerful in production today, will be used to power such fighters as the Navy's new "Corsair", which is capable of higher and faster flight than any other plane of its type.

Binoculars, Trailers, Other Material

Although Nash-Kelvinator's major war effort is in the field of aviation, the company also is concerned with the manufacture of many other articles needed for victory. One war contract, that of manufacturing thousands of transport trailers for the U. S. Army, already has been completed, and the plant where this work was done has been turned over to another armament maker for the assembly of tanks.

Still another plant has been in production for several months on a restricted item calling for an extremely high degree of manufacturing precision. Manufacturing departments in other plants which cannot be immediately employed to further the company's aviation work are being used to turn out parts for other manufacturers of war material. A dozen or more different items are being made on such a sub-contractural basis by Nash-Kelvinator. One of the company's plants is engaged in manufacturing Army binoculars. Nash-Kelvinator's entire effort now is devoted to war work, commercial production of consumer goods having long since been terminated. Each of its eleven plants, including English and Canadian subsidiaries, is dedicated to the cause of the United Nations.

S S S

SPOT CONDITIONING SPEEDS WAR PRODUCTION

WITH the tightening of critical materials, many new plants are, of necessity, air conditioning only vital areas instead of the entire plant. For example, an airplane plant recently erected a duplicate factory except for the 6000 hp. air conditioning plant. Instead, the plant uses several small scattered air conditioning units for essential production spots.

"Spot" air conditioning is increasingly used for such things as special manufacturing processes, laboratories, testing rooms, and storerooms for instruments and perishable supplies. Often individual self-contained units are applied up to 25 tons. For higher capacities a central system may be required.

Spot conditioning of special manufacturing areas is essential to much war production. A typical case is in holding constant temperature and humidity while cutting marine propulsion gears. At one plant, each of the precision hobbing machines are in separate insulated rooms and air conditioned by 25 units ranging from 2½ to 5 tons.

Holding constant temperature throughout the continuous 17-day gear cutting period maintains the close tolerances. Similarly, low relative humidity prevents condensation on the gear and tools. From two to four men work in each room and outside air is introduced, mixed with room air and brought through the air handling unit to provide a proper working atmosphere. The internal design conditions are 75° F. dry bulb, held within ± 1° F., and the relative humidity is held at approximately 60 per cent.

The rooms vary from 12 ft. x 16 ft. high to 38 ft. x 32 ft. x 18 ft. high and are of double steel construction with insulation between the walls. Each air conditioning unit has a heating and cooling coil; 18 evaporative condensers are used for condensing purposes.

Henry Products Follow the Flag!

AT HOME • ABROAD • ON THE SEA . . .

Today—let's concentrate only on winning the war. Nothing is more important than restoring human rights to enslaved millions and making our own precious Democracy secure. Because Henry Products are needed by the armed forces, our workers, our machinery and our resources are in the service until an all out Victory is achieved.

PACKLESS AND PACKED VALVES • STRAINERS • DRYERS FOR REFRIGERATION AND AIR CONDITIONING
AMMONIA VALVES • FORGED STEEL VALVES AND FITTINGS FOR OIL, STEAM AND OTHER FLUIDS

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Lack of Refrigeration Service Causes Huge Losses from Food Spoilage

A SURVEY issued by the Refrigeration and Air Conditioning Contractors Association of Detroit shows that because of a shortage of refrigerator service, huge supplies of foodstuffs are spoiling and that the taking of refrigeration service men by the military forces has created a situation in which essential installations of refrigeration equipment have broken down and been forced to become inoperative.

Even essential installations of commercial refrigeration systems are going without proper servicing and the average home owner with an electric refrigerator cannot expect to receive any service at all. The survey, based on a questionnaire to all refrigeration and air conditioning contractors in the city of Detroit, shows the following situation:

Results of Survey

Ninety per cent of all refrigeration service work now being done by Detroit contractors is for essential installations, including war production plants, schools, hospitals, meat markets, ships, etc. Only 10 per cent of the service work is being done for home refrigerators, bars, recreation centers, etc.

An average of between 300 and 400 calls per day are made on refrigeration firms in Detroit which they are unable to handle because of lack of employees, lack of materials, etc.

The estimated value of foodstuffs spoiled because refrigeration systems were not serviced amounted to more than $9,000, according to the few contractors who answered this specific question. Others were more general, some stating a figure of 700 lbs. of foodstuffs spoiled, and others stating that they had knowledge of several dollars a day spoilage.

More than 80 per cent of the contractors revealed a serious shortage of men and figures submitted by 70 per cent of those replying showed that a large number of men had already been inducted into military service and that nearly twice as many would be needed today to handle all service calls promptly at the present rate.

Ninety-five per cent of the contractors answered that there was no one available to carry on their business in the event that they were inducted into the military service, and if that should happen, it would be necessary for them to close their place of business.

It was also shown that action of tire rationing boards in refusing to grant service men tires or recaps for cars used in their business is further limiting the number of calls that can be handled per day.

S S S

SHOCK REFRIGERATION PROTECTS FLYING SUITS

A PERIODIC cycle of cooling and heating is proving to be the best method of protecting expensive wool-and-fur flying suits from moths while they are stored between flights.

The normal storage temperature is 35 to 40° F. In the "shock" cycle, the storage room temperature is reduced to 15° F. for several days to kill any larva which may be feeding. Then, by cutting off the refrigeration and introducing heat (usually from strip heaters in the supply duct or coil chamber), the storage room temperature is quickly raised to 50° F. where it is held for a few hours only. This causes any surviving larva to again become active and will hatch out any likewise potentially dangerous eggs.

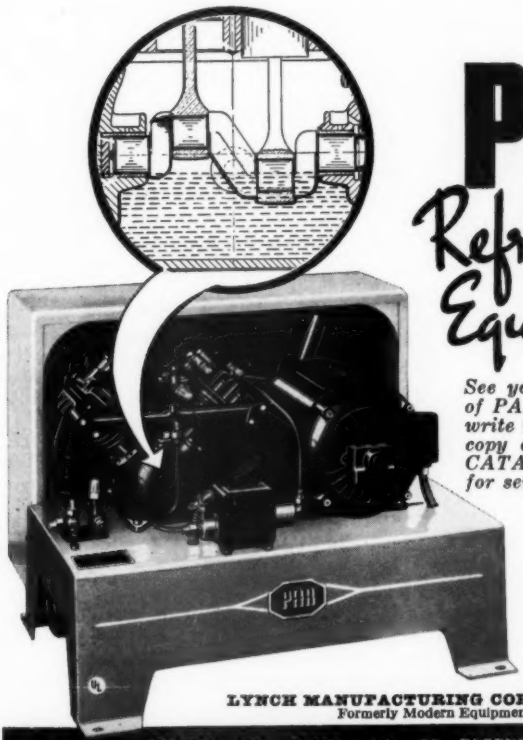
The temperature, after this few hour period at 50° F., is again suddenly dropped to 15° F. for a day to kill off the surviving larva and any larva newly hatched. After one day at 15° F. the temperature is brought back to the 35° F. or 40° F. storage condition.

This entire procedure is repeated at regular intervals or, to prevent reinfestation, when any appreciable quantity of untreated articles of clothing is placed in the storage room. Relative humidity is high enough to prevent drying and cracking of the fur skin, but low enough to prevent mould or mildew. During the normal storage period with temperatures of 35 to 40° F., the relative humidity is about 50 per cent to 65 per cent.

Drop-Forged Crankshafts In All Par Models!!!

All PAR compressors are equipped with drop-forged steel crankshafts . . . precision machined, case hardened, ground and lapped to a mirror-like bearing surface. Yes, PAR compressors are designed and built with painstaking craftsmanship . . . just like a fine automobile engine.

PAR refrigeration models are engineered as complete units . . . not just a group of sub-assemblies bolted together. That's why, when you install a PAR, you can be secure in the knowledge that you are giving your customers maximum efficiency at minimum operating costs.



PAR Refrigeration Equipment

See your jobber's display of PAR equipment . . . or write the factory for your copy of the FREE PAR CATALOG "R", a manual for service engineers!

LYNCH MANUFACTURING CORP., Defiance, Ohio
Formerly Modern Equipment Corp.

★ ★ FOOD — THE FIRST LINE OF DEFENSE . . . CONSERVE IT WITH REFRIGERATION! ★ ★

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

COMMENT ON QUESTION 512

EDITOR of Question Box: In the past months, you have had several questions on home-made lockers. As I did not quite agree with some of the quoted data, I thought I would tell of my experience with them.

The first I made was a well-type box, 20 in. x 68 in. x 30 in. deep inside with 6 in. Palco Wool insulation built inside a walk-in box, also with 6 in. Palco Wool insulation. I used 75 ft. of ½ in. copper tubing, cut in two 36 ft. lengths, and bent on 3 in. centers, spaced evenly and soldered to the sides of the outside of the interior metal liner.

After it was installed, but not in operation, I received last month's issue of R.S.E.S. and was somewhat worried after checking your data on a much smaller box. In starting the unit I blocked the switch for a temperature check. At the time of the check the walk-in was not refrigerated so the top, side, and end had only 6 in. of Palco Wool for insulation. The box temperature was down minus 33 degrees at 17 in. CH3CL in twelve hours, and is now operating at zero degrees at 7 in. and 2 lb. CH3CL setting. The owner reports excellent operation.

The second case is an 8 ft. Majestic cabinet. The coil was made using 20 ft. ½ in. steel tubing, bent on 3 in. centers and soldered to a plate, fitting the back and interior of the cabinet. This operates zero degrees, at 12 in. and 2 lb. CH3CL. This cabinet is for my own use, and I realize the operational cost is high due to a thin insulation as a ¼ H.P. Frigidaire S.O.2 unit, converted to CH3CL, runs 80 per cent of the time. This experience might be of help to someone, building such a unit.

HIGH HEAD PRESSURE

QUESTION 514: We have a Frigidaire (SO_2) that is 12 or 14 years old. The owner turned it off last fall and it wasn't pumped down. When they turned it on a couple of weeks ago it started running and hasn't quit. When we were called on, gauge showed 3 lbs. suction (low side) pressure and 200 lbs. high side pressure. We discharged for possible air and the pressure lowered to 150 lbs. and suction to 5 in. allowing it to shut off. The first coil of the condenser was hot, but bottom coils were cool. When we rapped on the receiver it seemed empty. What would cause this condition and what can be done to remedy it?

ANSWER: All the symptoms you have stated indicate that there is air in the Frigidaire system. How this air got there is difficult to say, although we can be sure that it is through an opening to the atmosphere. One thing that often happens to sulphur dioxide systems when they have been shut down over the winter time, or for any extended period, is that refrigerant will condense in the crankcase. Then when the machine is started, nearly all the oil is pumped out of the crankcase with the refrigerant.

It takes quite a little time to get this oil back to the crankcase again and there is danger during this period that the seal will run dry and admit air. Perhaps in the lengthy period that this machine ran before you were called the seal did leak, then as the oil was returned to the compressor the leak stopped.

There is the other possibility that you still have a leak in the low side and it would be well worth your while to make a thorough check of all joints. The indications are that there is still air in the system because 150 lbs. head pressure is too high for a sulphur dioxide system.

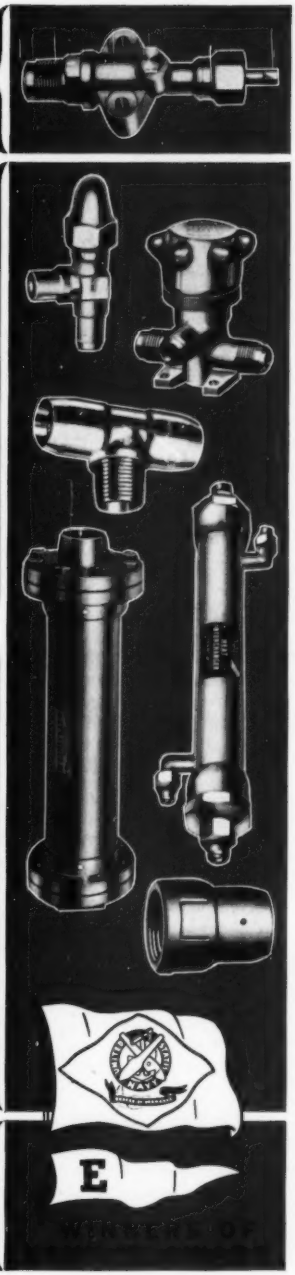
I would suggest that you purge the condenser until the head pressure is not higher than 90 lbs., then add more refrigerant if this becomes necessary.

HOW ABOUT THE COILS WHEN CHANGING GAS?

QUESTION 515: Can coils that have been used on Sulphur Dioxide be used on Methyl Chloride or Freon or vice versa? By using the expansion valve that is made for the gas that is to be used.

What would be the result if a small display case that has been used on sulphur was used on a Methyl Chloride compressor?

REPUTATION
COMES TO THE FRONT



● Mueller Brass Co. valves, fittings and accessories have always had an enviable reputation for reliability, efficiency and long service life.

Since our ability to produce and supply these items is so necessarily restricted, due to our country's war effort, reputation is doubly important.

Although there are many refrigeration products that you will be unable to procure, you can, in many cases, devise ways and means of accomplishing the purpose through your own knowledge and skill. Conservation, too, is highly important and there are many items which can be repaired and used again and again.

Naturally, our armed forces are getting first call on our material resources and man power, but we can still supply many of the parts you may need — and to the extent that we are permitted, we shall continue to produce standard essentials for the Refrigeration Trade.

Mueller Brass Co. products have a built-in reputation for quality and long service life. If you have a problem, write us. We will do our utmost to help.

MUELLER BRASS CO.
PORT HURON, MICHIGAN

I know of an instance where this was done and is so far still working satisfactory, if trouble does set in what would be the proper procedure to straighten it out and what will the trouble be like or how will it act?

ANSWER: Coils can always be changed from one refrigerant to another without any trouble occurring, providing they are cleaned and all the old refrigerant and oil are removed from them before the change is made.

There is only one exception to this and that is the case of aluminum coils which must not be used with methyl chloride. Aluminum can be used with any of the other commonly used gases with the exception of methyl chloride.

Those display cases which you mentioned have already been changed over from sulphur dioxide to methyl chloride should operate satisfactorily, providing no carbon or dirt were left in the coil which might develop trouble at screens or valve orifices.

REPAIRING FLOAT VALVES

QUESTION 516: Please describe to us the best method of reseating and calibrating float valves.

ANSWER: In repairing float valves, it is always recommended that the needle and seat be replaced if they are found to be leaky and I think that it is still possible to buy these parts so that you should not be up against the problem yet of having to make a repair on these small parts.

Test fixture for testing header assemblies of float valves.

A test fixture for testing the header assemblies of float valves can be constructed very easily from a scrap cooling unit by sawing off the upper portion of the cylinder and soldering a drain valve to the rear bottom of the cylinder as shown in the attached illustration.

For testing methyl chloride float headers, use a mixture of 50% oil and 50% Solvasol, Deo-Base or Kerosene. For testing of Freon or sulphur dioxide headers, use carbon tetrachloride. These solutions are suggested because they have a specific gravity close to that of the refrigerant used.

To make the test, assemble the float and header assemblies in the fixture. Connect an air line of from 50 to 75 pounds pressure to the lower valve, open your air valve, then pour in the recommended fluid as shown in the attached illustration. The liquid level should be about at the center of the float when the air bubbles cease. Should a re-check be desired, drain some of the liquid off through the petcock and repeat the test.

If the liquid level is considerably higher than the center line of the ball float, it is an indication that the float is out of calibration. Frost back would occur where a float of this type were used. Some float assemblies provide an adjustment for raising or lowering the float ball so that it will shut off at the desired level. Others incorporate no adjustment and the float arm must then be bent to secure the adjustment required.

Should the air bubbles continue, even after the float ball has become submerged in liquid, it indicates that the needle leaks badly. In this case it becomes necessary to replace the needle and seat, or if these parts cannot be secured, the needle and seat will have to be repaired.

FRIGIDAIRE EE-5

QUESTION 517: I've been working on a Frigidaire model No. 836496 EE-5 and have experienced trouble. I sent for a new thermostatic expansion valve. This valve being exact duplicate of the original and installed same. It was set for 15" vacuum and that looked like it wasn't right so I adjusted it so it held about 8" vacuum. With that adjustment I got good results as far as cooling. It would cool down to 10° in evaporator, but I have been unable to set the pressure control in any way so it will keep it cold. Could the trouble be with the bulb or where could it be? The compressor pumps a vacuum of 28" or 29" and the head pressure is according to pressure temperature chart. I would appreciate it if you could inform me as to the correct setting of expansion valve and proper method of setting the control.

ANSWER: I am not sure whether you are under the impression that the Model EE-5

Frigidaire unit is equipped with a thermostatic expansion valve or whether this statement was a typographical error on your part. The expansion valve used on these units is a little unusual in that it has a connection from the top of the diaphragm to an equalizer bulb located in the top of the cabinet. This gives it somewhat the appearance of a thermostatic expansion valve, but it is in fact an automatic expansion valve. The equalizer bulb is merely for the purpose of allowing breather space for the top of the valve while at the same time sealing it against the entrance of moisture.

The expansion valve setting for these units is from 4" to 7" of vacuum. This variation is due to the difference in room temperature and the possible difference in evaporator temperature. These pressures I have given you are for room temperature of 85°.

The thermostat used on this unit and the T-5 unit are identical. There are two adjustments on it, both of which can be reached from the top of the thermostat. Looking down on the thermostat, you will notice a knurled nut with a lock nut under it located about the center of the thermostat. This is the adjustment for raising or lowering the temperature. The arrow on the thermostat itself will indicate the direction in which to turn it for colder or warmer.

Examine Contact Points

Before making any adjustments, however, it is a good idea to examine the contact points to see that they are in good condition. There should be at least 1/8 of an inch clearance between the arcing shoe and the upper contact when the switch is open. If the clearance is not correct, bend the lower contacts. Then, to determine that the action of the switch is not sluggish, rotate the differential spring and lubricate with a drop of oil, if necessary.

The differential spring and adjustment is on the right hand end of the thermostat as you face the refrigerator. This spring acts as the toggle snap-action part of the control. By turning the screw in, you increase the differential and decrease it by turning it out.

The adjustment on this differential is quite critical since a very slight amount of turning will change the differential to quite a large extent. The screw should never be turned more than one complete turn either way at any time.

Repairs or Replacement

Make present equipment do for the duration! Use the genuine replacement parts shown below. We always carry a complete stock.

GENUINE REPLACEMENT PARTS FOR

CHIEFTAN
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Every issue contains ideas you can use—don't miss an issue.

NORGE WAS OIL LOGGED

QUESTION 518: I was called recently to service a 1935 Norge, the complaint being that it was very noisy. I traced the noise to the compressor, otherwise the refrigerator seemed to be working normally; that is, the cycling seemed to be alright and it was refrigerating. Thinking that the oil from the compressor might be lodged in the evaporator, I boiled it out by filling the ice trays with hot water. After this operation the noise from the compressor ceased and it was refrigerating properly.

I left and about four hours later the same woman called me again. The refrigerator had not stopped running since I had left. The thermometer which I placed on the lower shelf of the evaporator would not go below twenty degrees. I put the gauges on; the high side pressure was 60, the low side was 0. These readings were maintained without much change. I added some gas until the head pressure read 80, low side was 10 inches which was normal for the surrounding temperature. This seemed to eliminate the trouble.

There were no gas leaks at any time and what I would like to know is why it required gas. Did the boiling out of the oil from the evaporator have anything to do with its requiring gas, and if so why?

ANSWER: Yes, I think that the boiling out of the oil from the evaporator had something to do with its requiring gas—at least this would be the indication, although not the base of the trouble. It is a characteristic of nearly all flooded coils that when they become low on refrigerant the space that should be occupied by the refrigerant is gradually filled with oil.

In other words, as the refrigerant slowly escapes over a period of years, oil will be pumped from the compressor and will collect in the evaporator. The evaporator will still remain full of refrigerant and oil mixture, but the percentage of oil will be higher.

When you boiled out the evaporator, thus forcing the oil to return to the compressor, you left a higher percentage of refrigerant in the evaporator, and the system indicated a shortage of refrigerant. Had you added refrigerant without boiling out the evaporator, you would have arrived at the same results. In other words, the refrigerant would then have replaced the oil in the evaporator, forcing the oil to return to the compressor.

SETTING EXPANSION VALVES

QUESTION 519: I am having some trouble with a Norge Model X2NAS2 unit used in a beverage cooler. It has a Mayson automatic valve for refrigerant control and has a bare tube coil inside the water compartment.

This unit operated alright last summer and I closed the service valves for winter storage. The owner forgot about the valves and ran the unit a short time, possibly an hour, before he turned it off. The rollator will pull a quick vacuum when I cut off the suction valve and head pressure is normal or slightly above, so I believe the valves were not damaged.

It seemed to be short of gas as it ran all the time and cooled the water to only 50°. Back pressure was about 2 pounds, and head pressure about 90. I purged it after running without belt to cool it down, and head pressure was about 75. The valve does not hiss, but I added about a pound of gas to see what that would do. I also tried setting the valve for both higher and lower suction pressure. I really believe the valve is O.K. as I can set it wherever I want to, but I do not know the correct back pressure for this setup. It seems to me if I could set the valve right, it ought to do better.

Can you tell me how to determine if this unit is low on gas and how to set the exp. valve? I like a sight glass, but cannot install one on every job. I guess I could discharge it and add 3 pounds of sulphur, but that seems like too much trouble.

ANSWER: I have no data on the Norge Model X2NAS2 unit in this office, therefore, I don't know the correct setting for the expansion valve. When in doubt about the setting of an automatic expansion valve, there is always one good method by which you may arrive at the proper setting.

Allow the unit to run until the evaporator or the space to be cooled is down to the desired temperature. Then open your expansion valve until frost or sweating occurs on the return line. This will indicate that the entire coil is being refrigerated. Then reduce the setting on your expansion valve until, when the machine is almost ready to cut off, the frost line is no more than two or three inches out of the evaporator.

By setting the valve in this manner you are assured of operating at the highest back pressure obtainable for the temperature desired; thereby you will obtain the most

(Continued on page 46)

We, too, SERVE UNCLE SAM

● By now people generally have begun to realize that refrigeration and air conditioning are more than conveniences and luxuries. Both are vital necessities to our nation's success in the war!

That fact practically puts us in the army. We in this industry who supply and service the equipment on which so much depends, have a responsibility that goes far beyond our peace-time obligations.

Every time a refrigeration service man repairs existing equipment, restores it to efficient operation, he strikes a blow for Uncle Sam. Whenever existing automatic controls cannot be repaired to serve, Penn can supply the needed refrigeration controls under existing priority rules. *Penn Electric Switch Co., Goshen, Indiana.*

PENN CONTROLS

REFRIGERATION, AIR CONDITIONING, ENGINE HEATING, PUMPING AND AIR COMPRESSOR

Wanted For Vagrancy!
EMPTY CYLINDERS
Must be put to work. Shortage is Acute

AN announcement by Kinetic Chemicals, Inc., Wilmington, Del., emphasizes the fact that while there is no shortage of Freon-12, an acute shortage of Freon cylinders is imminent. This shortage is threatened by the obvious shortage of steel as evidenced by the numerous limitation orders of the War Production Board. As a result, manufacturers of the type of steel cylinders used for refrigerants are only able to make deliveries on orders rated AA-1 and AA-2. It is practically impossible to obtain these high ratings for any materials for civilian needs. Thus, new cylinders for refrigerants are out of the picture.

Four Point Program

The bright side of the situation is the fact that there are enough Freon cylinders in existence to meet civilian needs if the empty cylinders are returned promptly. Many sellers and users of Freon-12 have not returned cylinders as promptly as they should. To forestall the threatened shortage, all users are urgently requested to assist in carrying out the following four-point program:

1—Check records now and find out who has cylinders in which Freon was sold this year.

2—Telephone every customer who has Freon cylinders and urge them to return their empties at once.

3—Send truck to bring in cylinders not otherwise obtainable.

4—Ship empties to Kinetic Chemicals, Inc., Carneys Point, N. J.

If all service men will cooperate in returning empty cylinders, the net result will eliminate the danger of a shortage, and Freon-12 deliveries can be maintained without difficulty. Reduced to its simplest terms, it means that an individual service man must return his empty cylinders promptly in order to protect himself on delivery of his next order for Freon-12 cylinders. Obviously, with new cylinders out of the picture, the manufacturer of Freon-12 will be out of luck in trying to make shipment unless empties are returned promptly.

This is one of those things which sounds easy to accomplish, but which, in actual practice, will fall down unless given constant supervision. This is especially true at the present time, when every service man is working long hours and doing much more than his usual stint of work, under many retarding obstacles. A shop rule, calling for a daily check on the matter, is about the only thing which will guarantee satisfactory results.

S S S

QUESTIONS AND ANSWERS

(Continued from page 44)

efficient operation. This would also indicate whether or not you have sufficient refrigerant in the system. If you can obtain frost on the suction line, it will indicate sufficient refrigerant to refrigerate the entire coil, and if there is no hissing in the expansion valve, there is every reason to believe that the system contains enough refrigerant.

NEED METHYL CHLORIDE?

Now is the time to get it!

Ample supplies of Methyl Chloride are at present available for the charging and servicing of installations which may be constructed or serviced under existing War Production Board regulations. We expect to be able to fill the approved requirements of the refrigeration industry so far as material is concerned. It is suggested that you do not stock up unnecessarily. Empty and return all cylinders promptly. Electrochemicals Dept., E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

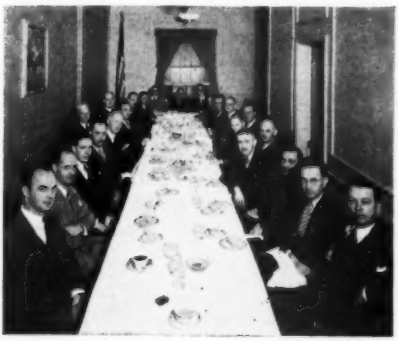
DU PONT

METHYL CHLORIDE

Better Things for Better Living . . . Through Chemistry

SUPPLY JOBBERS DISCUSS FUTURE OF BUSINESS

A MEETING of the Midwest Refrigeration Supply Jobbers Association was held in Des Moines, Ia., Sept. 28. The program covered "The Future of the Refrigeration Supply Jobber." O. A. Friemel and F. R. Pond spoke for the jobbers, and Herman Goldberg and Mr. Delavan spoke for the manufacturers.



Left to right: J. E. Corbitt, Penn Electric Switch Company; Robert M. Anderson, Imperial Brass Company; J. A. Hanson, Minneapolis-Honeywell; C. S. Ruegg, Ruegg Refrigeration Supply, Omaha, Nebr.; C. S. Anderson, Imperial Brass Company; Fred B. Hovey, secretary of the National Refrigeration Supply Jobbers Association; K. B. Thorndike, Detroit Lubricator Company; H. S. Hoffman, Hoffman Supply Company, Springfield, Mo.; E. L. Tramposh, Refrigeration Equipment Company, Kansas City, Mo.; L. H. Roberts, Forslund Pump Machinery Company, Kansas City, Mo.; Mr. Delavan, Delavan Engineering Company; Herman Goldberg, manufacturers' representative, Chicago; E. L. Bengston, Republic Electric Co., Davenport, Iowa; W. E. Burch, Winterbottom Supply Company, Waterloo, Iowa; J. P. Kleinheksel, National Refrigeration Parts, Sioux City, Iowa; J. P. Wickham, Wickham Supply Company, Lincoln, Nebr.; L. C. Strobeck, Dayton Rubber Company; H. N. Haselwood, Howard Supply Company, Wichita, Kans.; F. R. Pond, Refrigeration & Industrial Supply Company, Minneapolis, Minn.; A. W. Deits, Interstate Machinery and Supply Company, Omaha, Nebr.; O. A. Friemel, Brass and Copper Sales Company, St. Louis, Mo.; J. F. Boyd, Dennis Refrigeration Supply, Des Moines, Iowa; and Tom Plouff of the Ansul Chemical Company.

Refrigeration Service Engineers' Society

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

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DES MOINES CHAPTER, DES MOINES, IOWA: Meets 2nd Wednesday. President, L. C. Bennett, 418—15th St., Des Moines, Iowa. Secretary, Melvin Haas, 3215—50th St., Des Moines, Iowa.

FOX RIVER VALLEY CHAPTER, OSHKOSH, WISCONSIN: President, E. K. Wagner, 516 Jackson Drive, Oshkosh, Wisconsin. Secretary, V. O. Bliss, 111 Van St., Neenah, Wisconsin.

FURNITURE CITY CHAPTER, GRAND RAPIDS, MICHIGAN: President, William Wilbur, 403 Lowell Ave., N.E., Grand Rapids, Michigan. Secretary, Ray P. Falicki, 922 Richmond, N.W., Grand Rapids, Michigan.

HUDSON MOHAWK CHAPTER, SCHENECTADY, NEW YORK: Present, Edwin J. Walters, 101 Prospect St., Schenectady, New York. Secretary, William R. Andrews, R.F.D., Glenmont, New York.

ILLINOIS VALLEY CHAPTER, PEORIA, ILLINOIS: Meets every other Friday. President, Dean Reynolds, Lewiston, Illinois. Secretary, Henry Loercher, 518 Kreitzer Ave., Bloomington, Illinois.

(Continued on page 50)

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(Continued from page 48)

INDIANAPOLIS CHAPTER, INDIANAPOLIS, INDIANA: Meets 2nd and 4th Tuesday. President, Leon Teetor, 5629 Winthrope, Indianapolis, Indiana. Secretary, Harold Klepfer, 2740 Winthrope, Indianapolis, Indiana.

KANSAS CITY CHAPTER, KANSAS CITY, MISSOURI: Meets 2nd and 4th Tuesday. President, F. D. Smith, 4528 Mercier, Kansas City, Missouri. Secretary, A. M. Hoover, 1509 Sterling, Independence, Missouri.

LINCOLN CHAPTER, LINCOLN, NEBRASKA: Meets 1st and 3rd Monday. President, J. E. Cole, 119 N. 16th St., Lincoln, Nebraska. Secretary, M. G. Hester, 1612 So. 17th St., Lincoln, Nebraska.

LONE STAR CHAPTER NO. 1, DALLAS, TEXAS: Meets 1st and 3rd Monday. President, J. M. Bibb, 708 W. 7th St., Dallas, Texas. Treasurer, M. D. James, 3802 Swiss Ave., Dallas, Texas.

LONE STAR CHAPTER NO. 2, FORT WORTH, TEXAS: President, A. M. Johnson, 720 E. Roberts, Fort Worth, Texas.

LONG BEACH CHAPTER, LONG BEACH, CALIFORNIA: Meets 1st Thursday. President, Demarest Voorhis, 1920 Golden Ave., Long Beach, California. Treasurer, Donald H. Thompson, 3861 Marron Ave., Long Beach, California.

LOS ANGELES CHAPTER, LOS ANGELES, CALIFORNIA: Meets 2nd Wednesday. President, W. C. Irving, 1423 Lincoln Blvd., Santa Monica, California. Secretary, D. W. Irving, 1414 D-19th St., Santa Monica, California.

LOUISIANA CHAPTER, BATON ROUGE, LOUISIANA: President, E. A. Summer, P.O. Box 1782, Baton Rouge, Louisiana. Secretary, D. H. Swails, 939 Convention, Baton Rouge, Louisiana.

MADISON CHAPTER, MADISON, WISCONSIN: President, Harry Streich, Marshall, Wisconsin. Secretary, A. L. Robertson, 409 Walton Pl., Madison, Wisconsin.

MILE HIGH CHAPTER, DENVER, COLORADO: Meets 2nd Monday. President, H. R. McCombs, 1524—15th St., Denver, Colorado. Secretary, R. C. Kimmel, 702 E. 12th Ave., Denver, Colorado.

MISSISSIPPI VALLEY CHAPTER, DAVENPORT, IOWA: Meets 1st Tuesday. President, H. W. Strohmeir, 204 Ditwell Ct., Davenport, Iowa. Secretary, Ervin Meyers, 516½ E. 6th St., Davenport, Iowa.

MISSOURI VALLEY CHAPTER, OMAHA, NEBRASKA: Meets 3rd Thursday. President, Elton Lewis, 1415 So. 55th St., Omaha, Nebraska. Secretary, Ralph C. Walbridge, 4429 Sprague St., Omaha, Nebraska.

MONTGOMERY CHAPTER, MONTGOMERY, ALABAMA: Meets every Thursday. President, Milo B. Howard, 711 S. Lawrence St., Montgomery, Alabama.

MONUMENTAL CHAPTER, BALTIMORE, MARYLAND: Meets 2nd Wednesday. President, J. W. Mattheis, 2656 W. Franklin St., Baltimore, Maryland. Secretary, Herbert Frame, 607 Willow Ave., Baltimore, Maryland.

MOTOR CITY CHAPTER, FLINT, MICHIGAN: President, Einer Hansen, 716 E. Newall St., Flint, Michigan. Secretary, Chester Morgan, 1201 Ann Arbor St., Flint, Michigan.

MOUNT ROYAL CHAPTER, MONTREAL, QUEBEC, CANADA: President, J. Bruno Lacerte, 2529 St. Catherine St., E., Montreal, Quebec, Canada. Secretary, A. W. Dancey, Refrigeration & Air Conditioning, Gardenvale, Quebec, Canada.

NEW YORK CHAPTER, BROOKLYN, NEW YORK: Meets last Wednesday. President, Emil J. Merenda, 4018 Church Ave., Brooklyn, New York. Secretary, Eugene N. Phillips, 88-20 Rockaway Beach Blvd., Rockaway Beach, New York.

NIAGARA FRONTIER CHAPTER, BUFFALO, NEW YORK: Meets 1st and 3rd Wednesday. President, A. H. Keirn, 654 Woodlawn Ave., Buffalo, New York. Secretary, William Goeckel, 68 Brayton St., Buffalo, New York.

OIL CAPITAL CHAPTER, TULSA, OKLAHOMA: President, Wm. F. Campbell, 109 No. Main, Tulsa, Oklahoma. Secretary, Phil R. Brady, 1118 So. Harvard, Tulsa, Oklahoma.

ONTARIO FOREST CITY CHAPTER, LONDON, ONTARIO, CANADA: Meets 1st and 3rd Friday. President, J. F. Yeddeau, 10 Hume St., London, Ontario, Canada. Secretary, S. Kilmer, 5 Erie Ave., London, Ontario, Canada.

ONTARIO MAPLE LEAF CHAPTER, TORONTO, ONTARIO, CANADA: Meets 2nd and 4th Friday. President, Wm. Marshall, 105 Donegal St., Leaside, Ontario, Canada. Secretary, Charles A. Kirkwood, 216 Westmount Ave., Toronto, Ontario, Canada.

PHILADELPHIA CHAPTER, PHILADELPHIA, PENNSYLVANIA: Meets 2nd Monday. President, F. H. Grant, 6706 Lynford St., Philadelphia, Pennsylvania. Secretary, R. E. Russel, 3828 Mary St., Drexel Hill, Pennsylvania.

PITTSBURGH CHAPTER, PITTSBURGH, PENNSYLVANIA: Meets 2nd Friday. President, S. Paul Riddle, 338 S. Main St., Butler, Pennsylvania. Secretary, Charles C. Terrill, Box 247, Duquesne, Pennsylvania.

PONY EXPRESS CHAPTER, ST. JOSEPH, MISSOURI: President, W. B. Nichols, 311 So. 7th St., St. Joseph, Missouri. Secretary, E. J. Storm, 2815 Felix St., St. Joseph, Missouri.

PROVIDENCE CHAPTER, PROVIDENCE, RHODE ISLAND: President, Harold F. Donohue, 12 Central Ave., Wakefield, Rhode Island. Secretary, George H. Lutz, 17 Oneida St., Cranston, R. I.

ROCKFORD CHAPTER, ROCKFORD, ILLINOIS: Meets 1st and 3rd Monday. President, Chas. G. Henley, 6520 N. 2nd St., Rockford, Illinois. Secretary, Donald R. Starin, 1063 W. State St., Rockford, Illinois.

ST. LOUIS CHAPTER, ST. LOUIS, MISSOURI: Meets 2nd and 4th Thursday. President, E. C. Fix, 4712 Labadie, St. Louis, Missouri. Secretary, L. L. Vollman, 5342 Nagel Avenue, St. Louis, Missouri.

SAN DIEGO CHAPTER, SAN DIEGO, CALIFORNIA: President, Merle J. Pitts, 4303 Proctor Pl., San Diego, California. Secretary, William J. Fickler, 726—9th Ave., San Diego, California.

SCRANTON CHAPTER, SCRANTON, PENNSYLVANIA: President, Karl Muller, 1514 Holly Rd., Dunmore, Pennsylvania. Secretary, Chris G. Hess, 321 N. Everett Ave., Scranton, Pennsylvania.

SIOUX CITY CHAPTER, SIOUX CITY, IOWA: President, Harold Eriksen, 1303 West 19th, Sioux City, Iowa. Treasurer, J. W. McCarthy, 1318 Glass, Sioux City, Iowa.

SOUTHERN OHIO CHAPTER, PORTSMOUTH, OHIO: President, Forrest D. Poole, 1246 Coles Blvd., Portsmouth, Ohio. Secretary, George P. Kaut, 814 Prospect, Portsmouth, Ohio.

TOLEDO CHAPTER, TOLEDO, OHIO: Meets 2nd Wednesday. President, Dale Moog, 3812 Ruby Dr., Toledo, Ohio. Secretary, A. M. Payment, 465 Sackett Ave., Monroe, Michigan.

TRENTON CHAPTER, TRENTON, NEW JERSEY: President, Franklyn Beemish, 208 Brinton Ave., Trenton, New Jersey. Secretary, Raymond Pental, 22 Bismark Ave., Trenton, New Jersey.

TRI COUNTY CHAPTER, ELGIN, AURORA AND JOLIET, ILLINOIS: Meets 3rd Friday. President, B. V. Clark, 612 N. May St., Aurora, Illinois. Secretary, Clarence C. Stumpf, 401 Algona Ave., Elgin, Illinois.

TRI STATE CHAPTER, HUNTINGTON, WEST VIRGINIA: Meets 2nd and 4th Tuesday. President, Donald M. Young, 3333—13th St., Ashland, Kentucky. Secretary, Joe H. Campbell, 535—31st St., Huntington, West Virginia.

TWIN CITIES CHAPTER, MINNEAPOLIS AND ST. PAUL, MINNESOTA: Meets 1st and 3rd Tuesday. President, A. M. Palen, 3225—41st Ave., So., Minneapolis, Minnesota. Secretary, J. C. Ehlers, 468 Jackson St., St. Paul, Minnesota.

VIRGINIA CHAPTER, RICHMOND, VIRGINIA: Meets 1st and 3rd Wednesday. President, F. J. Magri, 603 Milton St., Richmond, Virginia. Secretary, R. W. Lampie, 3719 Vawter Ave., Richmond, Virginia.

WESTERN MASSACHUSETTS CHAPTER, SPRINGFIELD, MASSACHUSETTS: President, Walter Quimby, 26 Taylor St., Springfield, Massachusetts. Secretary, H. C. Lambert, 31 Elm St., Springfield, Massachusetts.

WICHITA CHAPTER, WICHITA, KANSAS: Meets 1st and 3rd Friday. President, H. B. Till, 1405 W. 35th St., Wichita, Kansas. Secretary, F. M. Barrell, 1512 Garland, Wichita, Kansas.

WORCESTER CHAPTER, WORCESTER, MASSACHUSETTS: Meets 1st and 3rd Tuesday. President, Michael Colbert, 6 Lisbon St., Worcester, Massachusetts. Secretary, John Brosnan, 390 Lovell St., Worcester, Massachusetts.

WYOMING VALLEY CHAPTER, WILKES-BARRE, PENNSYLVANIA: Meets 2nd Monday. President, Allan R. Reese, 104 Slocum St., Forty-Fort, Pennsylvania. Secretary, Telle Price, 43 So. Sherman St., Wilkes-Barre, Pennsylvania.

YOUNGSTOWN CHAPTER, YOUNGSTOWN, OHIO: President, Carl L. Dieter, P.O. Box 826, Youngstown, Ohio. Secretary, Dallas Nutt, 25 Essex St., Youngstown, Ohio.

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by H. G. VENEMANN

Associate Professor of Refrigeration
Purdue University

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The subject matter is graphically presented by the use of charts and illustrations in chronological order and the Table of Lessons reproduced indicates the important subjects discussed.

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Refrigerants.
Air as a Refrigerant.
The Theoretical Compression Cycle.
Variable Loads and Their Influence on Compressor Performance.
Theoretical Performance Characteristics of a Compressor.
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ILLINOIS STATE ASSOCIATION ANNUAL MEETING

FIFTY persons attended a meeting of the Illinois Association of the Refrigeration Service Engineers Society on October 18 in the Hotel Leland, Springfield. The ladies were invited, and formed a representative and enthusiastic contingent. The meeting elected the following officers for the ensuing year: *President,* Earl Seaton, Rockford; *1st Vice-President,* C. C. Stumpf, Elgin; *2nd Vice-President,* A. L. Fait, Lincoln; *Secretary,* G. W. Dresback, Normal; *Treasurer,* A. D. McGill, Peoria; *Sgt.-at-Arms,* J. K. Farrelly, Springfield.

President J. J. Kline, Springfield, opened the meeting with a pledge of allegiance to the flag, conducted by Mrs. Henry P. Loercher, sgt.-at-arms, Springfield Auxiliary. National President E. A. Plesskott, St. Louis, Mo., and Acting National Secretary J. W. Power, Chicago, were called upon by the chair and responded with a few remarks.

The following resolutions were read by Willis Stafford, Aurora, chairman of the committee, and accepted by the meeting:

Resolutions

"Whereas, the officers who have carried on the business of the organization, be it resolved that we extend a vote of thanks to them.

"Whereas, the members of our organization from time to time will join the armed forces, be it resolved that the dues of these members be suspended for the duration of their service.

"Whereas, National Secretary H. T. McDermott is now in the armed services and his duties have been delegated to J. W. Power, be it resolved that the convention go on record to fully cooperate with Mr. Power during his tenure in office."

On motion of Mr. Seaton, Mr. Power was made an honorary member of the Illinois Association. Telegrams and letters were received from various officers and members who were unable to attend: C. Buschkopf, Beaver Dam, Wisconsin; R. C. McCarthy, Rockford; B. V. Clark, Aurora; E. M. Mohler, St. Louis, Mo.; Harry D. Busby, Chicago; R. E. Sloas, Chicago, and P. B. Reed, Evansville, Indiana.

Following a 1:00 o'clock luncheon, Mr. Kline gave a short address, and then introduced Mr. Seaton, the newly elected President of the Illinois Association. Mr. Seaton made acknowledgement. He turned the meeting over to Herman Goldberg, Chicago, who introduced First Lieutenant McClevey, stationed at the Illinois State Fairgrounds in Springfield. Lt. McClevey, who is post engineer, talked of the importance of refrigeration in both military and civilian life.

Following Lt. McClevey's talk, Mr. Goldberg took the floor again, and presented some very interesting and informative material on priorities. His remarks are published elsewhere in this issue of THE REFRIGERATION SERVICE ENGINEER.

NOTES FROM A SECRETARY'S NOTE BOOK

As Written by John Brosnan, Worcester Chapter

September 1 at S. & R. Restaurant: Long, hot summer . . excess service . . no meetings since June . . lucky to get twenty . . installation of officers . . routine business session . . Treasurer collects dues . . no checks bounced . . ran out of receipts . . used menus . . outgoing Chairman of Entertainment arranges kosher corned beef sandwiches and malt beverages . . looks like a good year for eats . . Bill Tierney motions for adjournment and passes out individual checks for k.c.b.s.a.m.b . . maybe new Entertainment Chairman will give something for nothing . . maybe.

September 15 at Chamber of Commerce: Home to regular quarters . . 22 members . . out-of-city boys missing . . gas and tire rationing . . Hanson & Kroll made it . . members sway at ease in swivel chairs of Worcester business demons . . light siesta while Treasurer reads receipts and expenditures . . deep siesta while Treasurer harangues for payment of dues . . routine business . . one month in office and President has new shoes . . two men for examination . . examining board absent . . so in keeping with conservation program we salvaged examiners of other years . . Clarence Gaw and Earl Rockwell admitted to active membership . . buy yourself a pocket thermometer and a screw driver and you're a serviceman . . Treasurer collects from new men . . President visualizes a new suit . . Bob Davis championed move to pay dues of men in the service . . Ben D'Ewart and Aaron Krasnoff in the Army, and Hans Ohman in the Coast Guard . . adjournment

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October 6 at Chamber of Commerce: 24 members . . no President . . no First Vice . . chose lesser of two evils and 2nd Vice Harry Manchester presided . . Roberts Rules now reads Manchester Insists . . Tom Cronk with his camera . . even Davis' mustache is photogenic (Funk & Ingalls say this does not mean germ-proof) . . action and informal shots . . officers pose with nonchalance of a junior service engineer (domestic only) answering a call to check conditions on an ammonia job . . routine business . . talked about ethics and honesty . . President arrives . . ethics talk continues . . President blushes . . just painted his house . . while McDermott's away, Colbert will pay (his old bills) . . Entertainment Chairman Pierce Goodney lectures on Soda Fountains . . very interesting . . the traitor praises an old fountain that still uses ice . . defines dry ice cream . . no samples . . half-hour program of news reels by Tony Osper, Entertainment Chairman . . Sam Gaffin provided film, projector and re-wind instructions . . .

October 20 at General Refrigerator Service Company: Guests of Harry Manchester . . Harry, King and Manninen do their clock-watching here . . business session purged . . Secretary read minutes to himself and half an acre of used refrigerators . . introduction of Mr. Shephard . . welding instructor . . Educational Goodney gives you a topic . . you talk on it or dig up a substitute . . Harry provided a good man . . eye shields to all for actual welding and brazing session . . looks like the Buck Rogers Chapter . . candy machine did more than the Treasurer . . yellow card holders receive certificates . . Manchester and associates search the departing guests . . eye shields not included in $2.50 assessment . . State Convention in Springfield, Nov. 15.

J. P. MOYNIHAN KILLED IN FALL

JEREMIAH P. MOYNIHAN, 41 years old, of Worcester, Mass., member of the Worcester Chapter, R.S.E.S., died Wednesday, October 28. in Wesson Memorial Hospital at Springfield, Mass., from injuries received in a fall in one of the Armory shops earlier in the day. Mr. Moynihan fell from a staging to a concrete floor and suffered a broken back and fractured skull. He had been employed by J. E. Hammill, Lovell St., Worcester, for the past three years, and had given up his positions in that company to take the armory job.

R.S.E.S. Chapter Notes

MILE HIGH CHAPTER

Oct. 10—The annual meeting and dinner was held at the Oxford Hotel. After a delicious steak dinner, a brief business meeting was held, being called to order by President H. R. McCombs. The secretary read the minutes of the previous meeting, and the treasurer's report, both being approved as read. Some correspondence the secretary had received relative to tire rationing was read, and brief comments were made by some of those in attendance. From this letter, it would seem that service men's trucks would be entitled to new tires and tubes providing their old tires were beyond re-capping, and their cars would be eligible for recapping on the tires, or the cars would be eligible for obsolete new tires.

The president then reviewed the past year's activities of the chapter, and his report showed that the chapter had been very active in all national and local activities affecting refrigeration. He urged those members now in Defense Industries to continue their membership so that they would be ready for their own business again after the war. He noted that we had had two applications for membership in the past 30 days and have 23 paid up members to date, and urged that everyone attempt to get new members to keep the membership up.

After the meeting two gentlemen from the U. S. Navy Recruiting Service entertained us with some vivid motion pictures of the Defense of Egypt, The Battle of Midway, and the Coral Sea Battle, which were very timely and interesting. One of the gentlemen explained the procedure to follow in enlisting in the Navy and urged those present to investigate further if they were interested, or if they were about to be drafted in the army.

Following the pictures shown by the Navy Department, Mr. Meyers, a very clever magician pulled out his bag of tricks and proceeded to baffle his entire audience. Among other things he showed us how to smoke without the aid of tobacco; how to add up a column of figures without knowing what the figures were; and how to transfer cards from one hand to the other invisibly. Mr. Richey and Mr. Ernie Martin, who helped him in this last trick can vouch for the simplicity of it. The meeting adjourned at 10:30, with everyone present admitting it was the best meeting ever.

ONTARIO MAPLE LEAF CHAPTER

October 14—The meeting was called to order by President Marshall. One of the first orders of business was the acceptance of nine new applications for members. The new members are: Donald Fowler, Arthur J. Hunter, Michael Rudka, Joseph Hollis, George Gillies, Don Phillips, George Sweetman, Russell T. Harmsworth, Louis Degilio. In a discussion of the priorities situation, Ken Wood informed the meeting that service organizations using trucks would be able to secure retreads and those using private cars would get used tires. Questions regarding gasoline rationing would have to be taken up with the proper authorities, the merits of each individual determined by his particular conditions. Bill Marshall warned the meeting that it had come to his notice that a certain party was endeavoring to sell used fittings and warned that it is unlawful for anyone to buy such brass and copper without permission from the Metals Controller. The buyer, in such a case was inviting as much trouble as the seller.

Mr. Nye added to this statement by saying that any seller of such material must be able to show a license. It is only permissible to sell such fittings when done so from an inventory that is being closed out. Refreshments were served following the meeting.

ROCKFORD CHAPTER

August 17—A considerable portion of the business session was devoted to the financial outcome of the picnic and it was learned that approximately $21.00 was lost in the venture. The balance of the meeting was devoted to chapter matters and the passing of bills.

September 21—There were no committees to report at this meeting and very little business to be conducted. Some time was devoted to a discussion of the forthcoming state convention and the secretary was instructed to write the state president, stating the opinion of the meeting. Mr. McCarthy won the attendance prize of $2.90.

TWIN CITIES CHAPTER

September 1—President Palen called the meeting to order and Gaylord Randall read the new applications for membership received from Edward Kruse and Emmett O'Reilly.

A report from the picnic committee showed approximately $10.00 profit from the venture. Wives of the members were present

for the meeting and everyone was asked to stand and introduce themselves as a means of getting acquainted. President Palen then opened a discussion on the forming of a ladies auxiliary. The ladies were called upon to offer their expressions and suggestions and since the idea received favorable comment, Mrs. Lars Berheim was elected temporary chairman to carry on the plans. Refreshments were served following the meeting and movies of the 1942 picnic were shown.

October 6—Some discussion was had on the forthcoming gasoline rationing program and a committee was appointed to follow developments in this plan and keep the chapter posted in any changes made in gasoline rationing. C. A. McCafferty won the attendance prize of $2.60.

SPRINGFIELD CHAPTER

August 26—The meeting was held in the home of Kenneth Beatty. Mr. Kline introduced a motion to the effect that the chapter place a gold star on all membership records whose services are now in the country's military or naval forces. The motion was carried unanimously.

September 30—The greater part of the meeting was devoted to a discussion of the state meeting, which the chapter was endeavoring to secure for Springfield.

October 14—Considerable discussion was devoted to the state meeting, then plans were made for the fall and winter program of the chapter. First item on the program is the wiener roast to be held October 31 and during the discussion it was decided that more of the Springfield's famous pot luck dinners should be held. It was felt that these delicious ham dinners held at various members' homes have been instrumental in keeping Springfield Chapter alive.

DAYTON CHAPTER

September 13—The members of the chapter took their families to Edelweiss Park for an outdoor picnic. The weather, however, was not cooperative and as a result the attendance was not as large as expected. All those present, however, seemed to enjoy themselves and there was considerable talk of a bigger and better picnic later.

September 28—The meeting was held at the Engineers Club where the entire period was devoted to business. It was decided that an attendance prize should be offered at future meetings of at least $2.00.

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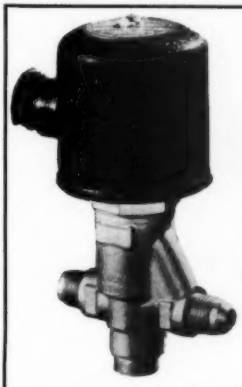

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KANSAS CITY CHAPTER

September 22—After the business of the chapter had been disposed of, a discussion was had on thermostatic expansion valves, their characteristics and applications. A future educational program was discussed at some length, but nothing definite was accomplished. It was felt that it was difficult to lay out such a program at the present time, because the war brought about so many drastic changes.

Ladies Auxiliary

KANSAS CITY CHAPTER AUXILIARY

The meeting was held in the home of Mr. and Mrs. DeWilde. After reading letters received from the War Chest Organization, a motion was duly carried to donate $5.00 to the drive. A handkerchief and card signed by all present was sent to Mrs. Sullivan. Refreshments furnished by the auxiliary were served to both the men and ladies.

October 5—The auxiliary entertained their families with a picnic. Due to rather threatening weather, the picnic was held in the home of Mr. and Mrs. Meeker, instead of Loose Park as originally intended. There were 20 present, among them, Mrs. Sullivan, former member, as guest. A hearty meal was enjoyed by all after which most of the men enjoyed the remainder of the evening playing cards.

ROCKFORD AUXILIARY

August 17—The ladies had a very enjoyable evening, first having dinner in the Casino of the Hotel Nelson. After dinner the ladies returned to the meeting rooms of the RSES chapter, where they joined their husbands.

September 21—The meeting was opened in the regular fashion by President Mrs. Dorothy Overman. It was decided to present Mrs. Don Starin's new baby with a suitable gift, therefore, Patsy, the new arrival, received a pink dress. Mrs. McCarthy, having recently had a birthday, furnished the cake for the evening. After the business had been completed, social activities occupied the balance of the evening.

October 19—The meeting was opened by Vice President Mrs. Kruse in the absence of the president who was on vacation. It was at this meeting that the identity of the auxiliary's Mystery Lady was revealed so that thanks were in order for the gifts received from each individual's Mystery Lady.

TODAY—MORE THAN EVER BEFORE

—you NEED the "RECALIBRATOR"

IN these days when it is difficult to get any kind of equipment, you have all the more reason for making certain that the equipment you DO get will handle its job properly. In gauges and dial thermometers this means Marsh—instruments with the "Recalibrator."

Any gauge or dial thermometer can be knocked out of adjustment. But if its a Marsh instrument with the "Recalibrator," the twist of a screwdriver restores it to complete accuracy at every point on the dial. The "Recalibrator" doesn't merely compensate for error—it actually eliminates the source of error. It's your best defense against the jars and jolts of service work for years to come.

JAS. P. MARSH CORP., 2059 Southport Ave., Chicago, Ill.

• The "Recalibrator" is available on all Marsh Gauges—standard on all Marsh Dial Thermometers. It is typical of the advanced design, the helpful features you'll find throughout the broad Marsh line—all products of 75 years of specialization. Write for refrigeration catalog.

MARSH

Refrigeration Instruments

MISSOURI VALLEY CHAPTER

October 1—The meeting was held in the home of Mrs. Lozier and Vice President, Mrs. Flohr presided. In a discussion of future plans, a suggestion was made and favorably received that each member bring a 10-cent defense stamp to each meeting and a drawing be held, the lucky winner of which would receive the stamps. Another suggestion was that the chapter enter into the Red Cross work which could be done during a period of each meeting. In appreciation of Mrs. Lozier's efforts in the past, the ladies presented her with a table cloth which was for her new home. Games and cards were played and refreshments were served.

* * *

NEW SUPPLY COMPANY

THE REFRIGERATION SUPPLY CO., INC., of 516-516 South Michigan St., South Bend, Ind., has filed articles of incorporation with the secretary of state at Indianapolis, Ind. It shows 100 shares having no par value. The incorporators are Frances Ann Hutchinson, Clarence Huggard and Guy F. Hutchinson.

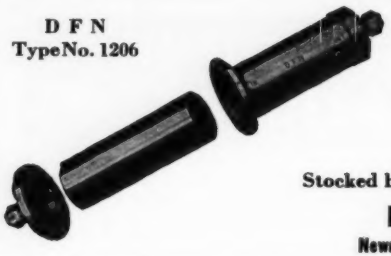
* * *

WILLIAM J. BROWN IN WAR POST

WILLIAM J. BROWN, who is widely known to dealers, jobbers and distributors in the New York state area as New York zone sales-manager of the original equipment division of the Minneapolis-Honeywell Regulator Co., has been transferred to a vital war production post. He is now attached to the Brown Instrument Co. division of Minneapolis-Honeywell and is in charge of expediting materials in the New York area.

The Brown division of M-H is devoting its entire manufacturing facilities to producing controls for war industries and recently announced development of the "Flight Recorder," which is making the flight tests of America's fighting planes more certain. The recorder automatically records temperatures at as many as 144 different points in a plane in three minutes.

D F N
TypeNo. 1206



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for the control of moisture, sediment and acid.
ASK FOR CAT. R-7.

Stocked by leading jobbers for your convenience.

McINTIRE CONNECTOR CO.
Newark New Jersey

NEW MODEL HEAT CIRCULATOR MEETS WARTIME NEEDS

THE new Reco Heat Circulator meets with wartime needs because it keeps rooms comfortably warm with much less fuel. The war program demands that everyone reduce the fuel consumption to the minimum. The Reco, according to the manufacturer, is a simple but revolutionary device. In order to have comfortable heat in the lower part of the room at 70° F. we usually have had to provide enough fuel to keep the temperature at the ceiling at approximately 90° F. because hot air naturally rises.

The Reco changes this condition. It forces the hot air at the ceiling down, making the air a uniform temperature at the ceiling, at the floor and throughout the room. It accomplishes this by blowing up. This forces the air to travel along the ceiling, down the sides and up the center again, putting all of the air in the room in gentle motion without annoying drafts.

The result is a uniform temperature with substantially reduced fuel consumption. This action also increases the humidity in the lower part of the room, making it more healthy to live in. Smoke and odors in crowded barracks, recreation rooms, etc. are dissipated and fresh re-vitalized air supplied instead.

By this means, rooms that are hard to heat because of their layout are kept comfortable. Assembly rooms, school rooms, churches, etc., which only require heat now and then normally need two or three hours to warm up. The Reco will heat them quickly.

Cold floors are eliminated in rooms that suffer from this discomfort. The lower part of rooms with overhead heating units are often difficult to keep warm because the heat clings to the ceiling. The Reco keeps the room comfortable by driving the heat from the ceiling and circulating it uniformly.

Reco Heat Circulators can be supplied with 20 and 24-inch propellers. They have three speeds. Require 110 volt, 60 cycle A.C. current. Priced at $39.50 up, plus excise tax. Manufactured by the Reynolds Electric Company, 2650 W. Congress St., Chicago, Ill.

WATER REGULATORS
Pressure-actuated, renewable seat, ⅜", ½", ¾" pipe fittings.

SHUT-OFF VALVES
Semi-steel, carbon-steel, double-seated stem, Angle and Globe type.

ALL STEEL GAUGE SETS
Safety ball seats shut off liquid in case of glass breakage.

DEHYDRATORS
Furnished filled with Calcium Chloride, Activated Alumina, or Drierite and Silica Gel.

STRAINERS
Cylinder and Cone types, and liquid line scale trap.

ALL-STEEL LINE VALVES
Compact in design, completely rustproof, Angle, Tee and Globe types.

CYRUS SHANK COMPANY
625 West Jackson Blvd. Chicago, Illinois

SUPPLY HOUSE ISSUES STATEMENT ON WAR POLICY

A VERY attractive statement has been issued by the Brunner Manufacturing Co., of Utica, N. Y., entitled "Brunner War Policy." This statement, printed on heavy, high quality paper stock, which is reproduced below, is being given wide distribution to all the users of Brunner air compressors and refrigeration equipment. This obviously covers all industries from aircraft builders to meat markets to Uncle Sam's battle fronts. Likewise all Brunner distributors, employees, and post-war prospects will be recipients.

BRUNNER
WAR POLICY

TO BE AMERICANS—working and conducting our affairs as Americans work and conduct their affairs—is an honor, a privilege of the highest order. ¶The Brunner organization cherishes this privilege. ¶It follows that we will put forth every effort, holding back nothing in loyalty supplying equipment required by our Nation for its Armed Forces and in its domestic economy. ¶We will fulfill to the very best of our ability every contract entrusted to us. ¶We will take special care that the high standard of performance built into our product in the past shall not now be lowered. ¶We will use substitutes for scarce materials wherever possible, in order to release these materials for use in products more directly connected with the actual prosecution of the war. ¶Substitutions will be made only when sufficient testing assures our selection of the best substitute material available, and one that will in no way detract from the performance of the equipment we build. ¶Refrigeration is vital to the health and strength of our Nation's military personnel as well as those who remain in industry to furnish the arms and ammunition with which our Armed Forces push on to victory. ¶Air Compressors are vital to the transportation facilities and many industrial operations upon which the victory we all desire so largely depends. ¶For these most excellent reasons, the facilities of this organization have been turned over, without reserve, to 100 per cent war effort, which includes maintenance of the half a million pieces of Brunner equipment already performing vital services throughout the world.

Like many other manufacturers, Brunner is entirely employed on war work. The "War Policy" statement is such a well-worded, concise and forceful explanation of the company's position that a large number of readers will be interested, particularly the one in reference to the release of vital materials and use of substitutes.

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Solenoid Valves

Type SL
For Freon, Methyl, Sulphur
Oil, Air and Water
Ask your jobber for details or write to
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of the Simoniz Company
2100 Indiana Ave. Chicago

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UNCLE SAM DID!
And now he's a regular customer.
The next order you place for
REFRIGERATION
PARTS ☆ TOOLS ☆ SUPPLIES
Try AIRO SUPPLY COMPANY
2732 N. Ashland Avenue
CHICAGO, ILLINOIS

GREASE RESISTANT AND ODORLESS
JARROW REPLACEMENT DOOR GASKETS
• Long life, resilient and conform to original specifications.
RECOMMENDED BY LEADING JOBBERS
JARROW PRODUCTS
420 North La Salle St.
Chicago, Ill.

HERMETIC REBUILDING

One of the largest hermetic rebuilding plants in the United States. Refrigeration units, parts and supplies. General Electric, Westinghouse, Grunow, Majestic, Crosley, Frigidaire, Norge, Kelvinator, and others. Write for catalog on your letterhead.

WANTED

OLD GRUNOW CARRENE METERS
Offering $1.00 Each

Ship to Us Any Quantity, Check Will Be Sent Immediately.

Service Parts Company **2511 Lake St. Melrose Park, Ill.**

WATER COOLED FREON CONDENSER

A NEW water cooled Freon condenser built in eleven different sizes for varying capacities is announced by Westinghouse Electric and Manufacturing Company.

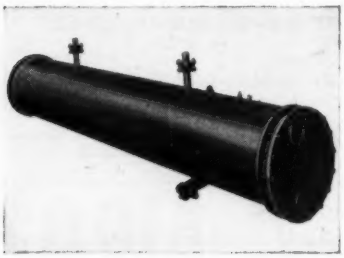

Fig. 1—Type CW-80 water cooled Freon condenser

This type of CW condenser gives a range of capacities from 5 to 100 tons each, net refrigeration effect. It is constructed of a seamless steel shell and steel tubes, with removable cast-iron header which can be arranged for either series or parallel water flow. All prime surfaces with no fins permits removal and replacements of tubes if necessary. Tubes are rolled into tube sheets and soldered to insure Freon tight joints.

The unit is equipped with a ball type valve for purging noncondensable gases. The condenser is designed with a fusible plug with melting point of 230°F. Designed to conform with specification of Unfired Pressure Vessel Section of the A.S.M.E. Boiler Construction Code, each condenser is tested under 300 lbs. per square inch pressure, cleaned and dehydrated, then sealed with 30 lbs. per square inch pressure of dry inert gas before shipped from the factory.

MUELLER THIRD QUARTER PROFIT

THE Mueller Brass Co., of Port Huron, Mich., for the quarter ended August 1, reports a net profit of $118,386, equal to 45 cents each on 265,517 common shares after provision of $1,200,000 for federal income and excess profits taxes. This shows a decrease from the previous quarter ending May 31, when a net profit of $363,612, or $1.37 a share, after $1,275,000 taxes, it was announced, and a decrease from the net profit of $460,597 for the August 1941 quarter. Net profit for the nine months of 1942 to August 1 totalled $963,030, or $3.63 a share after a $4,000,000 tax reserve.

To Promote The War Effort

—this organization has expanded its facilities to include training in WELDING and DRAFTING. Meanwhile we continue, as usual, our training in Refrigeration and Air Conditioning—the Industry which we have so long been a part of and served.

● UTILITIES ENGINEERING INSTITUTE
W. Belden & Wayne Aves. Dept. 45 Chicago, Ill.

EXPANSION VALVES
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Automatic (any make)	$1.25
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COLD CONTROLS

Domestic	$2.00
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All work done on money back guarantee.
Special price on quantity.
(All fittings must accompany order)

REFRIGERATION SURPLUS DEALERS
2209 N. Karlov Ave. Chicago, Ill.

CHARLES V. GARY IN THE SERVICE

A FAREWELL party in honor of Charles V. Gary, who was entering the Naval services, was given recently by the employees of the Henry Valve Co., Chicago, Ill. Mr. Gary now has the rank of lieutenant. Lieut.

Just before entering the military service, Lieut. Charles V. Gary was given a farewell party by the employees of the Henry Valve Co. Mr. Gary is the gentleman on the right.

Gary is now taking a special course of instruction at an eastern base to equip him for service in the Navy. He has legions of friends in the refrigeration industry all of whom join in wishing him the best of luck in his venture.

* * *

HERMAN GOLDBERG ANNOUNCES CHRISTMAS PARTY

HERMAN GOLDBERG, of the Herman Goldberg Co., Chicago, manufacturers' representatives, will hold his sixth annual Refrigeration Industry Christmas Party on December 11, 1942 in the Mural Room of the Morrison Hotel, Chicago. Invitations will be sent out very soon to everybody connected with the refrigeration industry. Mr. Goldberg says he will make a particular effort to invite those of the industry who, owing to war necessity, are temporarily engaged in other activities.

For the PERMANENT REPLACEMENT of STRATEGIC MATERIALS
SARAN
CHEMICALLY RESISTANT TUBING AND FITTINGS BY
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Saran Tubing by Hodgman is a tough thermoplastic specially made to replace strategic materials such as aluminum, stainless steel, nickel, copper, brass, tin and rubber. It is adaptable for use under high working and bursting pressures and is resistant to most chemicals. Its insulating qualities, flexibility and ease of handling make it extremely valuable in installations requiring the transport of oil, gas, air, water and corrosive chemicals . . . Flare type fittings of the same material make it possible to install a complete system with no more tools than a sharp knife and a flaring tool.
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The Refrigeration Service Engineer
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Automatic Expansion Valves (All Makes)	$1.50
Thermostatic Expansion Valves	3.25
Automatic Water Valves	2.50
Domestic Cold Controls (Modern Type)	2.50
Commercial Controls (Temp. or Pressure)	2.75
Commercial Dual Controls	3.25

ALL WORK GUARANTEED FOR 90 DAYS
Write for quantity prices
NEW DUTY
2424 Irving Park Blvd., CHICAGO

EQUIPMENT COMPANY BUILDS SHOT TESTING EQUIPMENT

AIR conditioning and commercial refrigeration dealers, by using their peacetime engineering experience with resourcefulness and ingenuity are making important contributions to the nation's war effort. One interesting example is the shot testing equipment designed and built by the Conditioned Air Equipment Co. of Minneapolis for a midwestern ordnance plant. A view of this installation is shown on the front cover.

The purpose of the equipment is to shock test 37-mm. shot before inspection by the Ordnance inspectors. The shot is armor piercing and if any strain, stresses, or defects are in the shot, the shock test cracks them open and the shot is rejected. The problem was to build this equipment to take up the least possible floor space and to tie it in with a streamlined production line. After a survey of the plant's requirements, the Conditioned Air Equipment Co. investigated other equipment for doing similar jobs. Some required up to 40 feet by 40 feet of floor space and considerable labor and maintenance to keep them in operation. So they decided to start out from scratch and came up with a unit taking up only 26 feet by 26 feet of floor space and requiring only the part time services of one girl to load and unload.

The unit consists essentially of a conveyor system leading in and out of a series of insulated tanks for water at 40° F. and 212° F. The shot is brought from room temperature to 40° F. (specifications call for cooling below 60° F.), in one water bath, is then plunged into a second bath with water at 212° F. In a third bath it is brought down to 40° F. again. From here it goes through a soluble oil bath to prevent corrosion.

Refrigeration for the unit is provided by a 5-hp General Electric condensing unit connected to an Acme cooler. The condensing unit, water cooling unit, and a circulating pump are mounted below the tanks. A standard General Electric gas-fired boiler supplies heat for the 212° tanks.

An interesting sidelight is a drinking water coil in the bottom of the cold water tanks. This is connected with a bubbler system to provide cold drinking water for employees. A mixing valve was placed in the line so that the temperature of the water at the bubblers may be maintained at any desired temperature.

ARMY-NAVY "E" GOES TO BRUNNER

FOR unusually high achievement in the production of essential war material, the distinctive Army-Navy "E" has been awarded to the Brunner Manufacturing Company, of Utica, New York, and its employees, it was announced October 20, by G. L. Brunner, President.

For many years past, the Brunner Company has been engaged in the manufacture of air compressors and condensing units for refrigeration, and its products have enjoyed a wide distribution both in this country and abroad.

"Plant conversion to the Nation's war effort has raised our peak of production to a new high level", said Mr. Brunner, "and a great portion of the credit must necessarily go to our men and women workers whose unstinted efforts have helped to bring this much sought-after honor to the Brunner Manufacturing Company".

Plans for the formal presentation of the Army-Navy "E" will be announced in the near future.

* * *

THE REFRIGERATION SERVICE ENGINEER
November, 1942

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, and March 3, 1933, of THE REFRIGERATION SERVICE ENGINEER, published monthly at 435 North Waller Ave., Chicago, Ill., for October, 1942.

State of Illinois, Cook County, ss:—Before me a Notary Public in and for the State and county aforesaid, personally appeared J. F. Nickerson, who, having been duly sworn according to law, deposes and says that he is the editor of THE REFRIGERATION SERVICE ENGINEER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, and March 3, 1933, embodied in section 433, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Nickerson & Collins Company, Chicago, Ill.; Editor, J. F. Nickerson, Chicago, Ill.; Managing Editor, J. F. Nickerson, Chicago, Ill.; Business Manager, L. R. Townsley, Chicago, Ill.

2. That the owners are: Nickerson & Collins Co., Chicago, Ill.; J. F. Nickerson, Chicago, Ill.; K. M. Stevenson, Chester, Pa.; Northern Trust Co., Philadelphia, Pa.; L. R. Townsley, Chicago, Ill.; Estate of Oscar Stevenson, Chester, Pa.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: There are no bondholders, mortgagees, or other security holders.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, as they appear upon the books of the company but also in cases where the stockholders or security holders appear upon the books of the company as trustee or in any other fiduciary relation, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which the stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) J. F. NICKERSON, Editor.

Sworn to and subscribed before me this 16th day of September, 1942. L. R. Townsley, notary public. [Seal.] (My commission expires July 8, 1944.)

HOW TO GET BUSINESS Today!

EVEN though civilian production of refrigeration has been curtailed, this industry's products are still being manufactured in a steadily increasing volume, for they are essential to our war effort . . . and this means there is a growing need for SERVICE.

Wherever Cold Plates are used there is service business for you . . . go after it in the following:

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REFRIGERATION IS A MATTER OF PUBLIC HEALTH!

WE ARE with you service engineers in keeping the nation's refrigeration in efficient operation during the toughest war in our history. With manpower reduced, replacement parts hard to get, tires and gas rationed, and calls for service numerous and urgent, you are still doing the job—and doing it right! We recognize our duty to get you the proper parts for your work. In doing that we have our troubles, too, but as always you can

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COOLING and FREEZING UNITS
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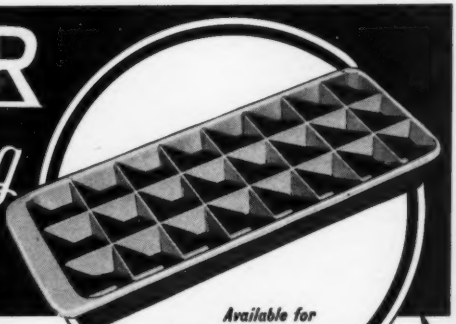

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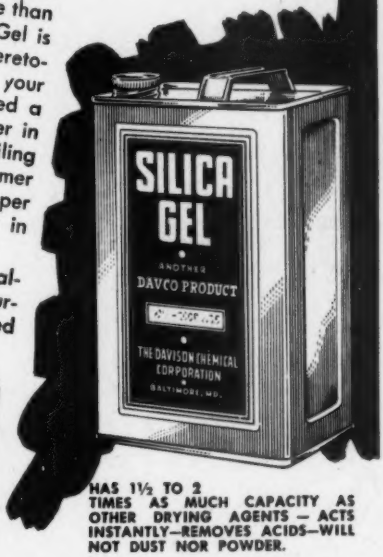
1. SERVICE ENGINEERS: Now you may purchase and use up to a total of 125 pounds of Silica Gel in any one calendar month without filing allocation forms.

2. JOBBERS: You may now purchase Silica Gel—*and we can supply you promptly*—up to a total of 125 pounds in any one calendar month without filing allocation form PD-600. Should you need more than 125 pounds per month, Silica Gel is available by filing PD-601 as heretofore. You may now deliver to your customers amounts not to exceed a total of 125 pounds per customer in any calendar month without filing PD-601. Should any one customer require more than 125 pounds per month, PD-601 must be filed as in the past.

3. SPECIAL EXEMPTION: No allocation forms are required to purchase or deliver dehydrators charged with Silica Gel.

The problems of the refrigeration industry are our problems. It is our policy to continue our cooperation, whenever possible, in the industry's efforts to safeguard its past accomplishments and to assure its future development.



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September 5, 1942

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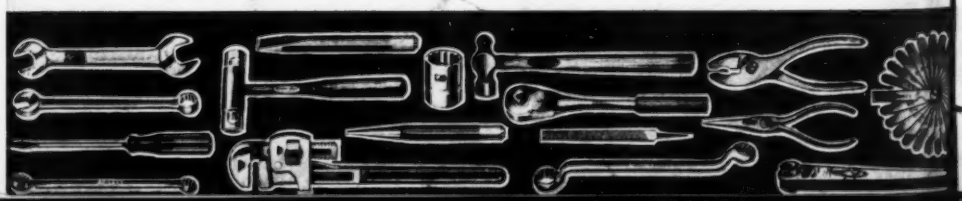
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